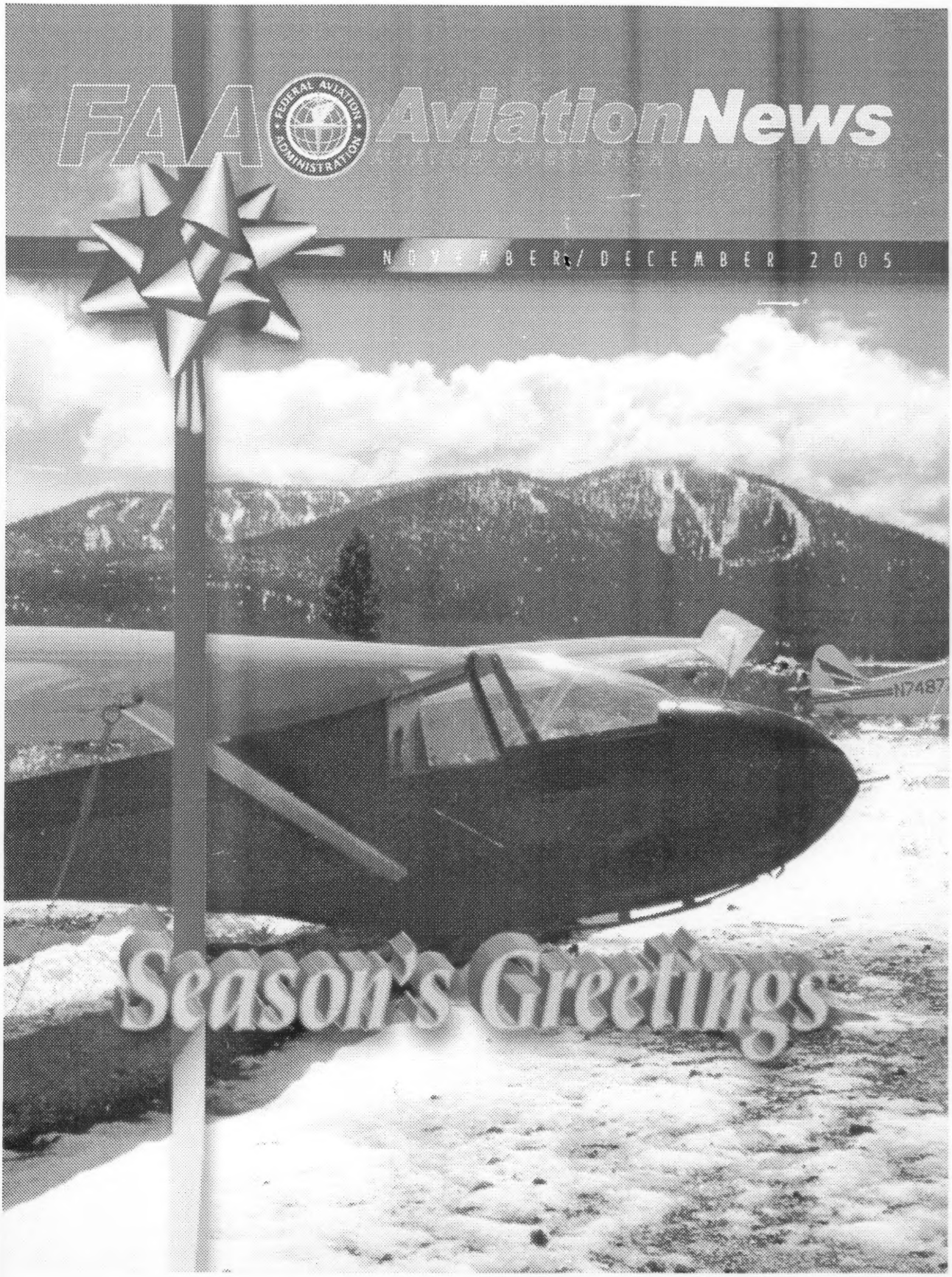
FAA
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NOVEMBER/DECEMBER 2005
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The FAA's Flight Standards Service, General Aviation and Commercial Division's Plans and Programs Branch (AFS-805) publishes *FAA Aviation News* six times each year in the interest of aviation safety. The magazine promotes safety by discussing current technical, regulatory, and procedural aspects affecting the safe operation and maintenance of aircraft. Although based on current FAA policy and rule interpretations, all material herein is advisory or informational in nature and should not be construed to have regulatory effect.

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FAA Aviation News

AVIATION SAFETY FROM COVER TO COVER

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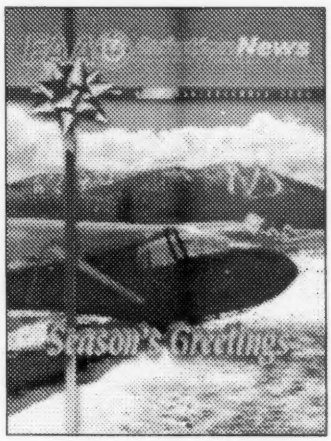


FRONT COVER: ...with our best wishes for a happy holiday season! (Mario Toscano illustration with a Dean Chamberlain photo)

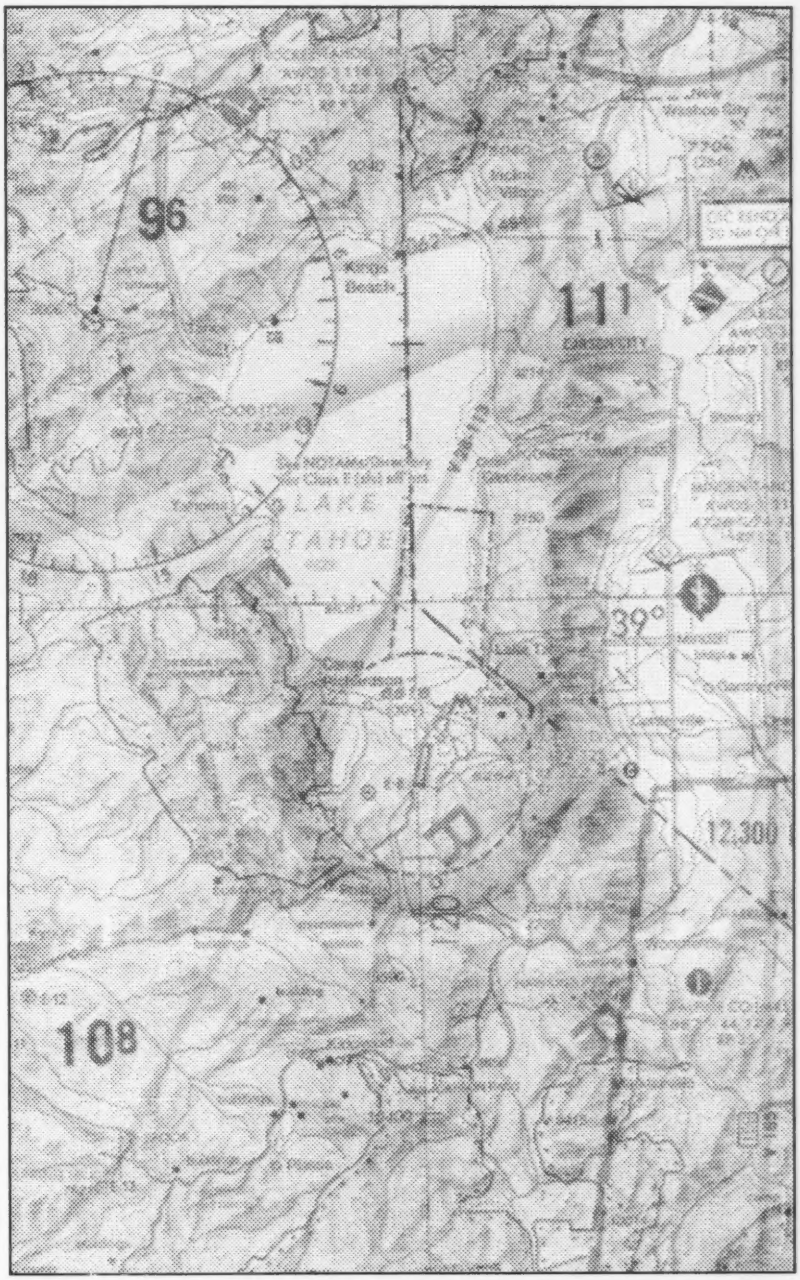
BACK COVER: A breath-taking moment at the 2005 Reno Air Race. (Kenneth R. Kelley, Reno FSDO, photo)

Lake Tahoe

by H. Dean Chamberlain

The name conjures up thoughts of a beautiful alpine lake set high in the California Sierra-Nevada Mountains. Located on the California-Nevada border just west of Reno, Nevada, the lake is a year-round playground for the young at heart. For many, it is their winter skiing escape on some of the best slopes in the nation. For others, it is their summer weekend get-away. For those who live there year around, it is home. But for some pilots flying into the South Lake Tahoe (TVL) airport, it can be a potentially dangerous operation. According to several of the FAA's Reno Flight Standards District Office (FSDO) aviation safety inspectors I spoke with recently while working in Reno, Lake Tahoe airport can challenge the unprepared pilot landing and taking off at the airport. One of the safety inspectors here in Washington, who used to fly into the airport from the San Francisco Bay area before he joined the FAA, concurred with the Reno inspectors and added a few stories of his own.

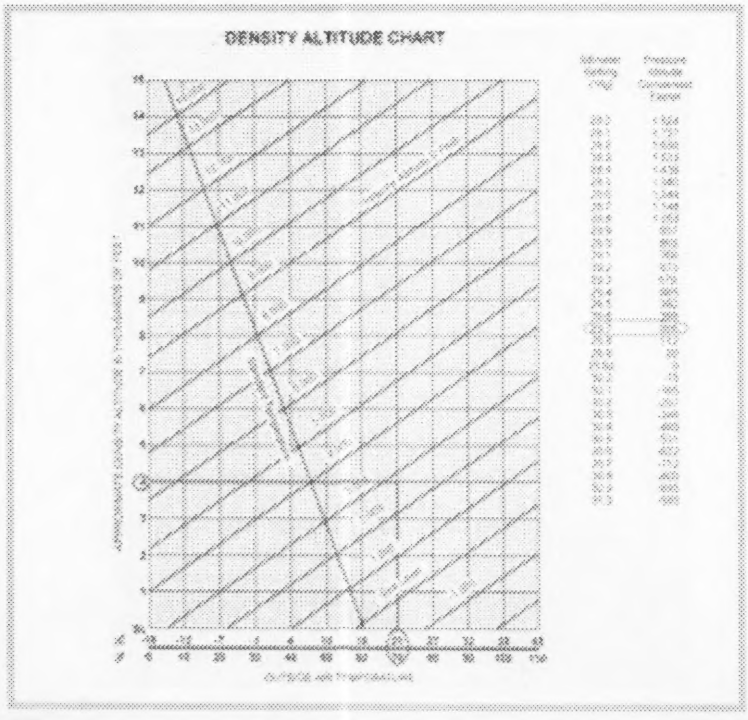
So why is *FAA Aviation News* writing about the Lake Tahoe area? The answer is while I was at the 2005 Reno Air Races in September, I asked the safety inspectors I was working with what were some of the "hot" safety issues within their FSDO's area of responsibility. The Lake Tahoe airport was the first airport mentioned. Having flown in a glider over the mountain that forms the eastern shore of Lake Tahoe just days earlier, I could easily visualize the airport and its surrounding mountains. Based upon my flight and the inspectors comments, I realized the Lake Tahoe airport would be a great example the magazine could use to remind pilots of some of the risks involved in flying into an airport that might have significant geo-



graphical differences from their home airfield as well as a way to remind all pilots of the need to consider density altitude and resulting aircraft performance in their flight planning. Differences that, if not recognized and compensated for, could spell danger. Are we saying South Lake Tahoe is a dangerous airport? The answer is no. It is not. But as the safety inspectors pointed out, local pilots familiar with the area have no problem safely flying into and out of the airport. Those who are at risk are those pilots operating outside their normal operating area. The purpose of this article is to remind all pilots to be careful when operating into airports outside of their experience levels.

Located on the south end of Lake Tahoe, the airport is located 6,264 feet above mean sea level (MSL). Its single runway (18-36) is 8,544 feet long by 150 feet wide. For most general aviation pilots, such a runway should meet everyone's basic needs. But therein lies the problem. This is not your normal eight thousand plus foot long runway near sea level. It is 6,264 feet above sea level. According to the Reno safety inspectors, pilots taking off towards the south have a unique problem. There are mountains off the south end of the runway that tower up to more than 10,000 feet MSL. The rapidly rising terrain forms a restricting funnel that can trap the unwary pilot flying a marginally performing aircraft southbound. Add in the fact Lake Tahoe is surrounded by mountainous terrain that goes up to more than 10,000 on some nearby peaks, and you can begin to understand what makes Lake Tahoe so unique.

When I searched the National Transportation Safety Board's (NTSB) aviation database for anything relating to Tahoe, the database returned 154 records dating back to 1964. This number may not be significant compared to other airports considering the fact the number covers more than a 40-year period. However, a quick review of some of the fatal accidents over that period reinforced what the FSDO inspectors had said. Although the NTSB database contained some of your typical aircraft accident causes such as engine failure and pilot error, many of the fatal Tahoe accidents I reviewed fit into three broad categories: density altitude and lack of aircraft performance, weather-related factors (such as turbulence, ice, snow, and reduced visibility), and rising terrain.



Some of the aircraft crashed when they could not out climb the rising terrain or while trying to avoid rising terrain in a blind canyon. According to the FAA inspectors, a typical scenario has a "lowland" pilot from the coastal area or central valley area of California flying into Lake Tahoe. Based upon a few of the accident reports I read, the pilot may or may not have received training in high-density altitude operations. So now we have a pilot with maybe a friend or two onboard the aircraft taking off from say an airport near San Francisco flying to Tahoe for the weekend. Being a well-trained, lowland pilot, the pilot may have filled the fuel tanks to full to avoid running out of fuel. Throw in some extra weight such as chocks, oil, and some food for the trip, and you can begin to see an aircraft at or near gross weight. Add in a hot summer day with temperatures in the high 80's or low 90's, and you can begin to see the problem. Your typical 30-plus year old general aviation (GA) four-passenger airplane is starting to have a serious performance problem at sea level. You may have had to use the entire runway while in ground effect to takeoff on the coast. What is going to happen when you are operating at 6,000 to 10,000 feet? Plus, if you have never flown a marginally performing aircraft in an area of turbulence and high density altitude conditions, how will you know when you have exceeded your personal and your aircraft's performance standards and capabilities? As the former California inspector said, "Aircraft are affected by density altitude. Mountains are not."

This fact was noted in one of the NTSB accident reports in 1966. The report involved a Cessna 182. NTSB listed the type of accident as collided with trees as the pilot flew into a blind canyon. Factors included the statement,"improperly loaded aircraft

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weight and/or C.G. [Editor: center of gravity]" The accident report remarks section included the following statement, "...rapidly rising MTN terrain exceeded ACFT climb performance...."

In another fatal accident the report said the pilot departed the Sacramento, California, area and, while descending, flew into mountains obscured by clouds. This is the basic definition of a controlled flight into terrain type accident where the pilot continues VFR flight into adverse weather conditions.

The Reno FSDO inspectors discussed the fact that weather conditions can change rapidly in the mountains and that pilots need to check and update their weather information when operating in such terrain and weather sensitive areas. They also mentioned icing was always a potential risk in the area during the late fall and winter.

In another accident, the report said the pilot failed to obtain/maintain flying speed while trying to climb to cruise altitude. The type of accident was listed as a mush stall. The remarks sections said, "...Down slope wind conditions exceeding acft capabilities."

In another density altitude type accident, the stall/spin accident report included in the remarks section the following statement, "Flew towards rising terrain atmtd to reverse course. D/A aprx 8300 FT."

The final accident I will mention highlights a comment made by the FAA inspectors, in the 1994 NTSB accident report, it said in part, "The pilot's failure to maintain adequate airspeed during initial climb under high-density altitude weather conditions and a resultant inadvertent stall/spin. Factors which contributed to the accident were the pilot's overconfidence in his personal ability, and his lack of experience flying the airplane."

The accident report included a statement about the airport that the Reno FSDO inspectors emphasized to me when they discussed the Tahoe airport. According to the accident report, it said the U.S. government flight information publication entitled *Airport/Facility Directory* contained the following remark, "Normal dep Rwy 18 is a wide left downwind dep, left crosswind turn should not be made until reaching the south arpt boundry and 7500'. If sufficient altitude is not reached after tkf for crosswind turn to a downwind departure with safety approximately 1.5 miles south is a golf course where you may circle to gain altitude...."

The Reno inspectors emphasized the importance of climbing over the golf course rather than continuing straight out of Runway 18. The danger is flying into the rising terrain that can box you in south of the airport. As noted in the other accident reports, an aircraft at or near gross weight may not be able to out climb the rising terrain in a high density altitude situation. This is especially true if there is a descending mountain airflow coming off the mountain flowing down over the airport to Lake Tahoe.

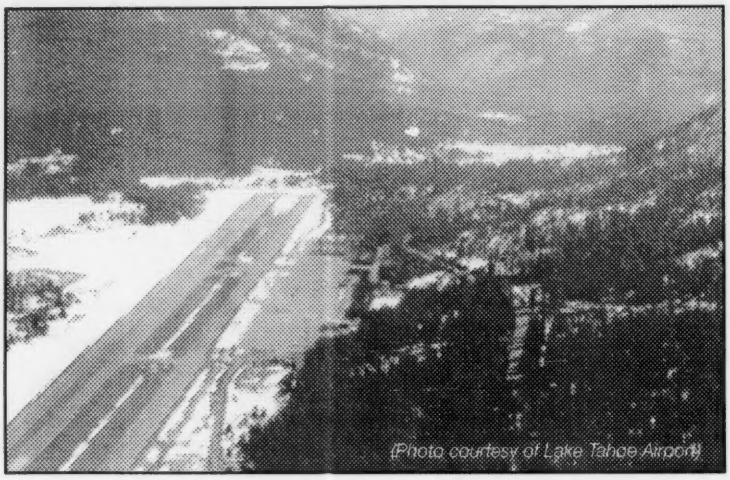
Lake Tahoe is not the only airport that may require a pilot to circle up to a minimum altitude before starting out on course in mountainous terrain. But the airport does serve as a good example of a resort airport that may attract pilots who may not be familiar with the terrain or the need to be able to operate their aircraft at its minimal performance level.

Although not an accident, the following narration highlights the fact that not only are single-engine aircraft vulnerable to density altitude considerations when operating from the Lake Tahoe airport, but so are light twin-engine aircraft. Multiengine pilots need to remember that light twins are not required to demonstrate single-engine climb capability as part of their certification. The 2004 NASA ASRS report involved a Cessna 310 light twin departing from Lake Tahoe airport on a day VFR flight. The private pilot reported that shortly after takeoff in his 1960 Cessna 310, the right engine seemed to have lost partial power. The engine did not sputter or make any odd noise and did not quit entirely. The pilot said he flew over the lake at 20 feet above the water to try and build airspeed while flying in ground effect. He said he thought he could ditch the aircraft near enough to people to be rescued if he had to ditch it, because he knew the aircraft would not fly on only one engine. After several passes, he said the right engine regained power and he was able to climb to a safe altitude and return to the airport. The engine was inspected and ran fine later. He reported density altitude and the engine being too rich were probable causes.

This narration illustrates the importance of pilots flying light, multi-engine aircraft to review their single-engine performance numbers before flying in the mountains as well as reviewing their aircraft's single-engine drift down numbers. In this pilot's case, he was able to resolve his problem over a large, flat lake rather than over rising terrain. But this case highlights the importance of careful preflight planning and being able to safely handle a potentially critical situation.

So what is the answer? The following recommendations, the list is not all inclusive, hopefully will challenge any pilot flying into a radically different operating environment to carefully review the area's operating requirements and the aircraft to be flown's operating limitations and performance requirements.

- Contact the nearest Flight Standards District Office for advice in how to operate in the area.
- Contact the airport's manager or fixed base operator for advice.
- Review the NTSB database for any listed accidents and review those accidents for any particular type of accident.
- Review the appropriate airport chart or charts and any published data for the area to get an idea of the type of operating environment you will experience.
- Check with the appropriate state aeronautical organization for any unique operating requirements or advice.
- Review and learn your aircraft's operating limitations and performance data.
- If you are going into the mountains for the first time, plan on stopping before you go into the



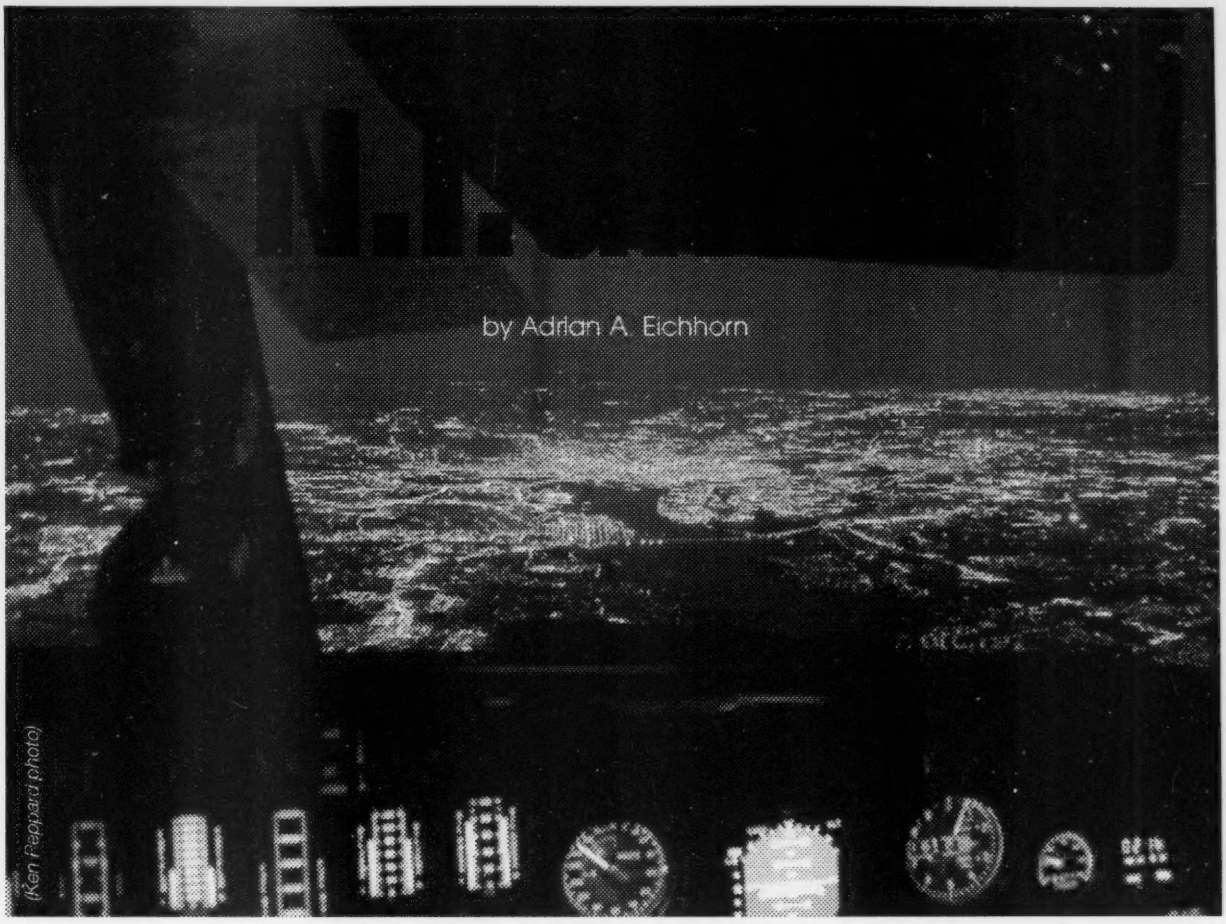
(Photo courtesy of Lake Tahoe Airport)

mountains for some local mountain training with an experienced and well-qualified mountain flight instructor.

- If density altitude will be a factor and if you have not calculated your aircraft's performance since your initial pilot certificate was issued, you might want to dust off your old student pilot manuals and run a few density altitude calculations.
- Then use those density altitude numbers to calculate your aircraft's expected performance numbers at that expected density altitude.
- You might want to check with your well-qualified local flight instructor on high altitude flight operations.
- If you are flying a light twin-engine aircraft, do you know its two engine operating limitations and its single-engine operating limitations?
- Since weather conditions in the mountains can change quickly, are you weather-wise about the area you plan on operating in?
- If instrument rated, are you current and proficient?
- If snow or ice may be encountered, are you prepared to divert to another airport if your aircraft is not certificated for known icing?
- Since aircraft weight has a direct bearing on its performance, have you reviewed your load and center of gravity calculations to ensure optimum performance under the expected conditions.
- Have you considered departing the high elevation airport with minimum safe fuel to reduce your aircraft's weight and then landing at an airport at a lower elevation to top off your tanks before continuing your trip?
- Have you considered making more than one trip with reduced loads out of a critical airport situation to reduce your risk and increase your aircraft's performance numbers rather than trying to take everyone and all their gear in one flight?
- Remember aircraft perform better in the cooler parts of the day such as early morning or near dusk. A few degrees in temperature may make the difference in a critical go/no-go situation.
- Remember turbulence is normally less early in the morning and later in the evening.
- Do you know how to make maximum performance turns in a small area in case you find yourself in a box canyon?
- Do you know how to use rising air currents, if available, to try and gain altitude in a critical operating situation?
- Do you remember the guidelines about approaching a mountain ridge at a 45 degree angle rather then straight on to make it easier to turn away from the ridgeline in case you decide you don't have enough altitude to make it over the ridge?
- Are you ready to make an off airport landing or controlled crash rather than risk a possible lose of control, stall, and spin type accident?
- Do you know your aircraft's recommended engine leaning procedure for high elevation operations?
- Finally, did you remember to reduce your aircraft's performance data to compensate for its age and wear and your possible less than test pilot skill level ?

These are just some of the ideas you might want to consider when flying into the mountains. Many of the ideas also apply if you are flying in other areas such as the desert, or in some cases, hot, humid coastal areas. Whether you are concerned about density altitude, not being able to climb out of ground effect, or weather-related issues, it is important to make good decisions and to execute them in a timely manner. Accidents have occurred when a pilot decided to abort a takeoff or landing, but the decision to execute that maneuver occurred too late for the pilot to avoid an accident or incident. Either the aircraft ran off the runway or hit an object while trying to make a go-around. In some cases, there are airports in various parts of the United States where once a decision is made to land, the aircraft is committed to land. There is no go-around option because of terrain. So these types of airports demand special flight planning.

But regardless of how careful you plan, aviation has certain inherent risks. The best insurance you can buy for your flight is to file a flight plan. If it is a VFR flight plan, you need to remember to activate it and later close it. IFR flight plans are normally activated by air traffic control, unless you are operating in a remote area where you may have to open and close your IFR flight plan. Remember the old saying, safety is no accident.



Editor's Note: Sometimes the simplest word can have a profound impact in the lives of pilots. NIGHT is one such word. The following nighttime safety tips provided by Adrian Eichhorn highlight the importance of the word N.I.G.H.T. The FAA Aviation News *safety staff hopes you enjoy this interesting play on the word and heed its message.*

In today's complex world of GPS, glass cockpits, and flight management systems, sometimes a simple rule of thumb or memory aid is still the best way for a pilot to avoid an accident. After a lot of work, I think N.I.G.H.T. is one such flight planning aid pilots should use before every night flight. Night flight has certain inherent risks. After a friend was killed in a nighttime accident, I started reviewing all the information I could find relating to night flying accidents including various safety recommendations. In summarizing my research, I think the five most important questions a pilot can ask or review before a night flight is contained in the acronym N.I.G.H.T. Each letter asks a question or relates to a topic that I think a pilot should consider before every night flight. The five simple letters stand for five critical issues that address important operational issues, potential hazards, or physical limitations—topics unique to night flight.

NOTAMS - did I check local NOTAMS?

When it comes to NOTAMs, you don't know what you don't know!

Every prudent pilot obtains a full briefing from a Flight Service Station or by using a DUAT session to ensure they have all the information necessary to conduct a safe flight. An important part of that briefing will be NOTAMs. But do you really know what you're getting ... or not getting? Often, the answer is "No!"

NOTAMs are classified into three categories: NOTAM (D) or distant, NOTAM (L) or local; and Flight Data Center (FDC) NOTAMs.

If your flight is to a distant airport, the NOTAMs you receive typically will include information on navigational facilities, frequency changes, and regulatory amendments. But, it will not include information contained in local NOTAMs. For instance, local NOTAMs include such information as runway or taxiway closures and airport lighting outages. A total or partial outage of a Visual Approach Slope Indicator (VASI) or Runway End Identifier Lights (REIL) system also will be reported as a local NOTAM.

The only way to obtain a local

NOTAM for your destination airport is to call the FSS responsible (see *Airport/Facility Directory)* or to call the airport manager.

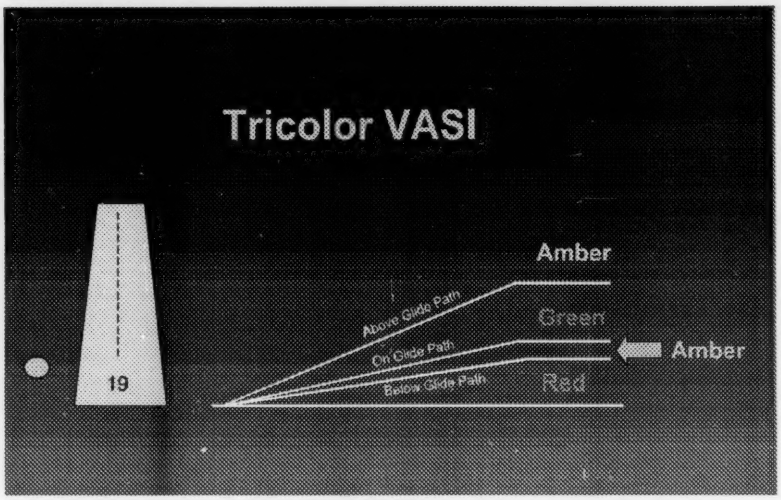
Illusions - have I considered them?

Many different illusions can be experienced in flight; some can lead to spatial disorientation while others can lead to landing errors. Illusions rank among the most common factors cited as contributing to fatal accidents.

Illusions Leading to Spatial Disorientation. Various complex motions and forces and certain visual scenes encountered in flight can create illusions of motion and position. Spatial disorientation from these illusions can be prevented only by visual reference to reliable, fixed points on the ground or to flight instruments. For more information on the illusions such as: Coriolis illusion; Graveyard spiral; Somatogravic illusion; False horizon; Autokinesis; Elevator illusion and the Inversion illusion, Refer to Chapter 8 of the *Aeronautical Information Manual (AIM).*

Illusions Leading to Landing Errors. Various surface features and atmospheric conditions encountered in landing can create illusions of incorrect height above and distance from the runway threshold. Landing errors from these illusions can be prevented by anticipating them during approaches and by using an electronic glide slope or VASI system when available. The most common illusions leading to landing errors are:

Runway width illusion. A narrower than usual runway can create the illusion that the aircraft is at a higher altitude than it actually is. The pilot who does not recognize this illusion will likely fly a lower approach, with the risk of striking objects along the approach path or landing short. A wider than usual runway can have the opposite effect, with the risk of overshooting the runway.



When using the Tri-color Visual Approach Slope Indicator (VASI), the below glide path indication is red, the above glide path indication is amber, and the on glide path indicator is green.

Runway and terrain slopes illusion. An up-sloping runway, up-sloping terrain, or both, can create the illusion that the aircraft is at a higher altitude than it is actually is. The pilot who does not recognize this illusion will actually fly a lower than normal approach. A down-sloping runway, down-sloping approach terrain, or both, can have the opposite effect.

Featureless terrain illusion. An absence of ground features, as when landing over water, darkened areas, and terrain made featureless by snow, can create the illusion that the aircraft is at a higher attitude than it actually is. The pilot who does not recognize this illusion will fly a lower approach.

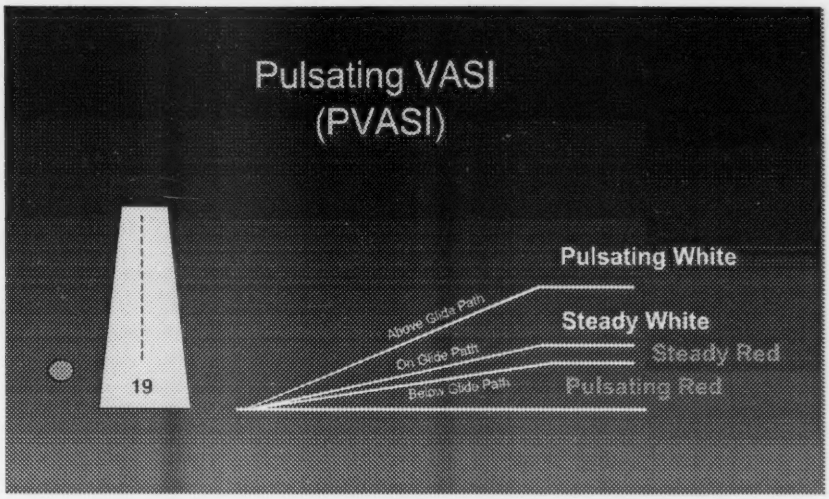
Atmospheric Illusions. Rain on the windscreen can create the illusion of greater height, and atmospheric haze can create the illusion of being at a greater distance from the runway.

Ground lighting illusions. Bright runway and approach light systems, especially when few lights illuminate the surrounding terrain, may cause the illusion of less distance from the runway. A pilot who does not recognize this will fly a higher approach. Conversely, the pilot over-flying terrain which has few lights to provide height cues may make a lower than normal approach.

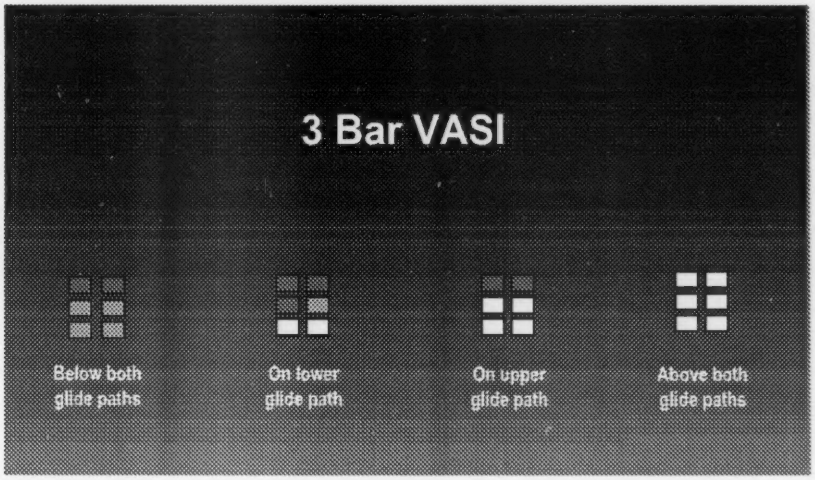
Glide slope - is one available?

Check to see if a visual or electronic glide slope is available before departing to your destination. Although visual glide slope indicators are installed at most airports, it's important to note that they may be installed at only one runway end. Also, there are many variations. Some of the not-so-common indicators include the Tri-color System, Pulsating System, Alignment of Element System, and the Three-bar VASI.

Tri-color System. Tri-color visual approach slope indicators normally consist of a single light unit projecting a three-color visual approach path into the final approach area of the runway upon which the indicator is installed. The below glide path indication is red, the above glide path indication is amber and the on glide path indicator is green. These types of indicators have a useful range of approximately one-half to one mile during the day and up to five miles at night. Note: Since the tri-color VASI consists of a



When using the Pulsating Visual Approach Slope Indicator (PVASI), if the aircraft descends further below the glide path, the red light starts to pulsate. The above glide path is a pulsating white light. The pulsating rate increases, as the aircraft gets further above or below the desired glide slope.



Three Bar VASI installations provide two visual glide paths. The higher glide path is intended for use only by high cockpit aircraft (Boeing 747, DC10) to provide a sufficient threshold crossing height.

single light source which could possibly be confused with other light sources, pilots should exercise care to properly locate and identify the light signal.

Pulsating Systems. Pulsating visual approach slope indicators normally consist of a single light unit projecting a two color visual approach into the final approach area of the runway upon which the indicator is installed. The on-glide path indication is a steady white light. The slightly below-glide path indication is a steady red light. If the aircraft descends further below the glide path, the red light starts to pulsate. The above glide path is a pulsating white light. The pulsating rate increases, as the aircraft gets further above or below the desired glide slope. The useful range of this system is about four miles during the day and up to ten miles at night.

Alignment of Element Systems. Alignment of elements systems are installed on some small general aviation airports and are a low-cost system consisting of painted panels, normally black, white or fluorescent orange. Some of these are lighted for night use. The useful range of these systems is about three-quarter mile.

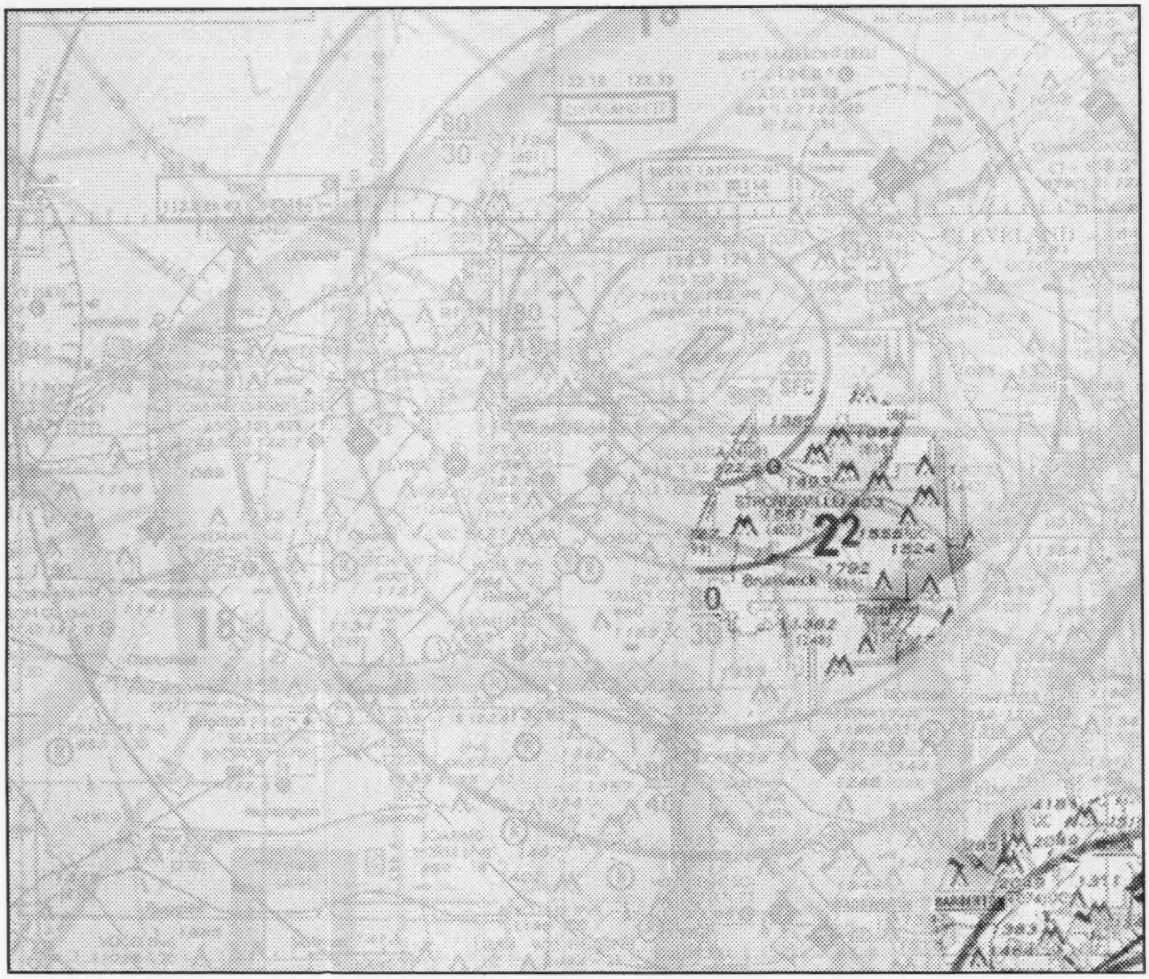
Three-bar VASI. Three bar VASI installations provide two visual glide paths. The lower glide path is normally set at three degrees while the upper glide path, provided by the middle and far bars, is normally 1/4 degree higher. The higher glide path is intended for use only by high cockpit aircraft (Boeing 747, DC10) to provide a sufficient threshold crossing height.

Note: although normal glide path angles are three degrees, angles at some locations may be as high as 4.5 degrees to give proper obstacle clearance. Pilots of high performance aircraft are cautioned that use of VASI angles in excess of 3.5 degrees may cause an increase in runway length required for landing and rollout.

How do I control lighting systems?

Operation of airport lighting systems (rotating beacons, approach lights, VASI, REIL, taxiway lights and runway lights) may be controlled by the control tower, a Flight Service Station (FSS) or by the pilot with radio control. On runways with both approach lighting and runway lighting (runway edge lights, taxiway lights, etc.) systems, the approach lighting system takes precedence for air to ground radio control over the runway lighting system.

Note: Although the CTAF is used to activate lights at many airports, other frequencies may also be used. The appropriate frequency for activating the lights on the airport can only be found in the *Airport/Facility Directory*



VFR sectional chart shows a Maximuum Elevation Figure (MEF) of 2,200 feet.

or on a standard instrument approach procedures publication. It is not identified on the sectional charts.

Terrain - how do I avoid it?

Avoiding terrain at night is easier if altitudes shown on VFR and IFR charts are used as part of your preflight planning.

VFR Charts show Maximum Elevation Figures (MEFs).

The Maximum Elevation Figures shown in quadrangles bounded by ticked lines of latitude and longitude are represented in THOUSANDS and HUNDREDS of feet above mean sea level. The MEF in the chart above is 2,200 feet. MEFs are determined by rounding the highest known elevation within the quadrangle, including terrain and obstruction (trees, towers, antennas, etc) to the next 100 foot level. These altitudes are then adjusted upward between 100 to 300 feet. Recognize this could give as little as 101 feet of obstacle clearance. Note the highest antenna on this sectional segment is 2,049 feet.

IFR enroute low altitude charts contain Off Route Obstruction Clearance Altitudes (OROCA).

On the IFR enroute low altitude chart, the Off Route Obstruction Clearance Altitude (OROCA) guarantees 1,000 foot obstacle clearance in non-mountainous terrain and can be used at night to ensure obstacle clearance. In mountainous terrain, this altitude offers 2,000 feet of obstacle clearance.

Adrian A. Eichhorn is 7,000-hour pilot for the FAA. He is a volunteer Aviation Safety Counselor, a NAFI Master CFI, and the 2001 National Safety Counselor of the Year. He also holds an Airframe & Powerplant certificate with inspection authorization (IA).

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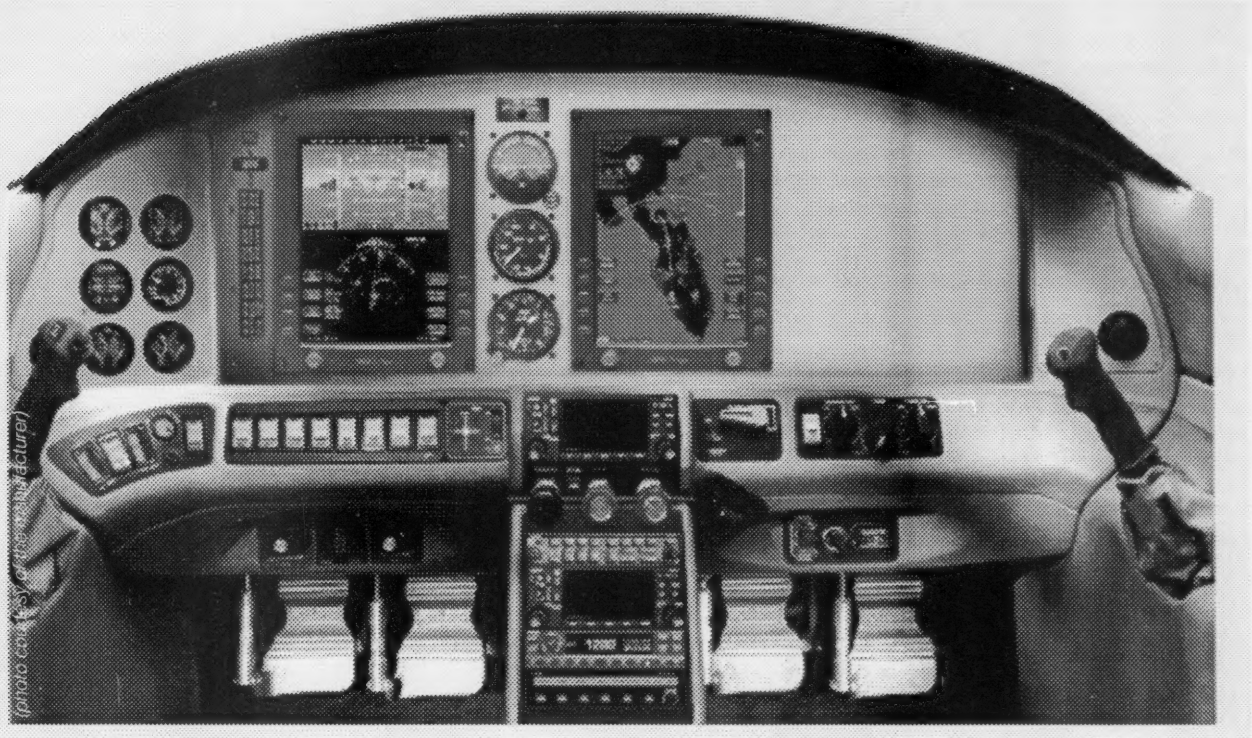


(photo courtesy of the manufacturer)

FITS-Based Scenario Training: Are We Ready for This?

by Mike Gaffney

It has been almost two years since I first heard of FITS (FAA/Industry Training Standards), which are training techniques being endorsed by the FAA to improve the process of teaching in technically advanced aircraft (TAA) by using mission-like scenarios and a student-based grading and evaluation system. Just as I had completed building 15 Title 14 Code of Federal Regulations part 141 approved courses, I thought, "Here is a new set of training standards that must be standardized across my flight instruction team." At first, I tried to get my arms around the program. What did it mean and why was the FAA not forcing it on its part 141 approved flight schools? I reviewed FITS specs from the official FITS website, but I could not initially see how the program conformed to our already part 141 approved private and instrument training programs and there seemed to be no roadmap to help me do it either. What made the FITS training different and why did it look like I had to reengineer our existing programs to attain FAA-Headquarters-based FITS committee approval instead of being approved by the local Flight Standards District Office (FSDO) or the FAA Regional office? This article will explore the evolution and application of the FITS program and will look at how it was applied to glass cockpit equipped aircraft training. It will suggest ways for other training organizations to successfully adopt the approach and thus raise the bar for the quality of aviation training in general.

FITS is Different from Traditional Training

I found out that my aviation insurance agent was participating on a committee that was looking at the FITS program as a way to enhance safety for light general aviation aircraft. That threw up the flag in my mind because, if the insurance industry was looking at it, then the FAA might not have to force it on anybody. It would become a de facto standard by virtue of the insurance underwriters requiring it. It was time to investigate this further so I could stay in front of an emerging trend. Besides, we were venturing pretty hard into the design of Garmin 1000™ training programs for our soon to arrive Diamond *DA40s* and Cessna *Skylane*, all featuring the new G1000 integrated glass cockpit. It then occurred to me that FITS was a perfect fit for a fleet of Technically Advanced Aircraft (TAA) featuring the G1000 cockpit, especially since the program was originally designed for this very purpose.

As we started to look at the FITS program, we started to see why it was so different from our 15 traditional task-based training programs already approved by the FAA for our part 141 training program. Task-based aviation training is geared to the practical test standard (PTS) by iteratively repeating an "I'll show you and then you show me until you get it right" approach until someone is deemed ready to pass an FAA checkride. It was based upon a traditional approach to training and in fact had gotten its roots in traditional education. It had worked for centuries

Mike Gaffney (right) and Steve Marsh (left) of Empire Aviation practice FITS teaching techniques using scenarios and lots of how and why questions. FITS teaching techniques require scenarios to be designed and planned by the student before starting the aircraft engine. FITS involves a new way of thinking on the part of the instructor pilot. (Brent Eddington photo)

and simply defaulted to use in aviation education starting early in the century and just continued into modern day general aviation training. With September 11, 2001, terrorist attacks and other events, general aviation was focused on survival and people did not have much chance to question training effectiveness, except for keeping the accident statistics trends in check.

If we look at the definition of a TAA, we see that it refers to any aircraft that has an advanced flight management system or, in other words for GA aircraft, an integrated GPS moving map navigation system integrated with an autopilot. Using this definition, we can see that most light GA aircraft manufactured before the 1990s probably did not qualify. Sure, some aircraft owner may have installed a LORAN or even an early generation GPS, and the avionic shop may have cobbled together some rudimentary way that it could talk to the CDI and maybe through some toggle switch labeled with a makeshift placard could even couple the glideslope to the autopilot. Did this kind of system require formal training to operate? Only if the aircraft was sold or otherwise loaned to a pilot who asked. Many times pilots simply experimented with the switches until they figured it out or they simply just ignored the functionality. Were these pilots just lucky or was the technology just not advanced enough to prevent pilots from figuring it out on their own without serious consequences? To take this example to the next level, would we expect that a pilot would be allowed to climb into a Cessna *Citation* or a Boeing 777 and just take it around the pattern while they figured it out? Of course not. Thus became the great divide that evolved between professional aviation and us general aviation training guys. There is probably not an airline or corporate jet pilot around today who did not learn to fly until airborne in at least one aircraft in his or her early flying career. Other than learning to fly at a professional training organization such as a university program, this simply was the norm. This "unimpressive" training situation was allowed to exist (and in many cases still does at some old school flight organizations around the country) until recent advances in cockpit automation was suddenly not only affordable, but thanks to companies like Garmin and Avidyne, were now also practical. Concern for safety of flight has prevailed and new training has quickly evolved similar to what professional aviators have encountered for years in advanced aircraft. When these pilots graduated to the next step in their flying career, they were required to go into advanced systems and avionics training and even procedures simulation prior to setting foot in the aircraft itself. This mindset was driven largely

by 14 CFR part 135 and part 121 and to a lesser degree by insurance underwriters, but everyone agreed that it drove the safety statistics and few questioned it. This is what Flight Safety and similar professional training companies have built their programs around.

What general aviation finally discovered is that the later model aircraft (such as the Cirrus, late model Cessnas, Mooneys, Pipers, Beechcraft, and Diamonds), even the ones with traditional "steam-gauge" panels with integrated GPS and autopilot all required more sophisticated training to operate safely, simply because the autopilots and the GPS systems have too many buttons to learn properly or safely on the fly. Aviation educators watched in disbelief as customers tried to figure out the new technology during taxi or, even worse, after already airborne during aircraft checkouts and flight reviews. As these systems crept into our cockpits, how could pilots keep a decent scan going if their heads were buried in the panel trying to figure out some device they had not taken the time to study before hand? The aircraft manufacturers figured this out pretty early and started requiring "factory training" before a new owner could fly the aircraft over the fence just in order to maintain liability protection. Having been factory trained as an instructor at both Cessna and Diamond aircraft for delivery of their G1000 aircraft, I learned a lot about the system, its operation, and its computer like programming requirements. I found it a welcome opportunity to ask many questions as an aviation educator so I could bring the official factory answers back to my clients and customers. How could I effectively build the programs back home for the flight school and the eventual renter pilot checkout programs, if I did not thoroughly understand the system and its features?

As a result of these early training experiences, our flight school implemented a mandatory avionic training program geared to Garmin and King equipped aircraft, especially since many of those aircraft came standard with the King KAP-140 autopilot (and because we felt like it made sense from an insurance perspective). We found that most pilots accepted this requirement as a prudent investment of their time, especially since we offered some of these programs each and every week at no cost to our customers. For those who didn't want to take the time, we reasoned that maybe they should not be in our aircraft, especially since our airport sat directly under a Class B airspace inviting an incursion for the pilot who was experimenting with buttons rather than keeping up situational awareness.

Why then, would a traditional task-based training approach not work for TAA aircraft? First, we must recognize that flying an advanced aircraft requires a pilot to master the operation of the autopilot and the other electronics onboard before actually flying the aircraft, even if the airframe and engine was nearly identical to ones that they had been flying for years. This requires a special training effort and in many cases a ground school simply dedicated to teaching systems and avionics, just like the professional pilot training programs.

With so many buttons and functions to teach and learn, could a traditional task-based approach effectively deliver the learning process required in order to improve safety trends and statistics? The answer is probably not. The General Aviation Manufacturers Association (GAMA) and avionic companies like Garmin, who worked with Cessna, Beech, Mooney, and Diamond, set up dedicated training programs for new pilot owners accepting delivery of these new aircraft that were all based on FITS techniques. Avidyne, working through the University of North Dakota (UND), did the same for Cirrus. Each has set up its own FITS accepted courses to certify with a standardized certificate that a pilot has accomplished a prescribed level of accomplishment through a self-rated system using known scenarios, defined at the end of the previous lesson, to practice in living color the range of normal and emergency procedures associated with operating a TAA aircraft panel. More importantly, the student has the chance to participate as a lesson designer and a stakeholder. By using prescribed scenarios, this allows the instructor pilot to act as a guide and the pilot-in-training gets to practice procedures that he or she can plan for, study for, and under the watchful eye of the carefully trained and standardized instructor, execute in a controlled manner. The next most fundamental aspect of the FITS philosophy is that the pilot-in-training must participate and even take a lead role in the evaluation of the performance after it is complete. At first this sounds like the cart leading the horse, but think about it. If you can get the student to completely participate in the construction of the flight scenario up front, then it only stands to reason that they can play a lead role in evaluating their feeling of accomplishment in achieving the scenario objectives, right? This in theory should result in maximum knowledge transfer to the student and hopefully results in the strongest committal of safe operating practices to long-term memory. This is what the FAA and the insurance companies want in the long run, don't they? Don't we?

FAA Aviation Safety Inspector Tom Glista is the FAA FITS Program Manager. He leads a committee of industry training leaders and stakeholders from the ranks of Embry Riddle Aeronautical University, Diamond, Cirrus, and Cessna aircraft, University of North Dakota, and others. This committee evaluates each and every course submitted for approval and comments back to the FAA about whether a program submitted for FITS review meets the intent of the program and should be accepted. Otherwise, the team suggests what specific issues must be addressed in order to bring the program into compliance with the FITS tenets set by the committee and the FAA. Neither the committee nor Tom Glista's FAA team has been granted specific enforcement authority over the programs once accepted other than to allow or disallow a course that is accepted to display the official FITS logo or to use the local

FSDO to encourage compliance, but this is changing as FITS accepted authority is being rolled out to the local FSDOs as we speak. Not much reward for the organizations who invest the resources to modify their existing courses or write new ones; then submit the program for review through several iterations waiting up to two months for a final go ahead on a single course TCO and syllabus. This is bound to change one way or another. If safety is compromised on a flight due to inadequate preparation of a pilot to use the technology, then changes will come. After all, this is how most of our rulebooks in aviation have been written over the past 100 years.

Traditional Training in TAA

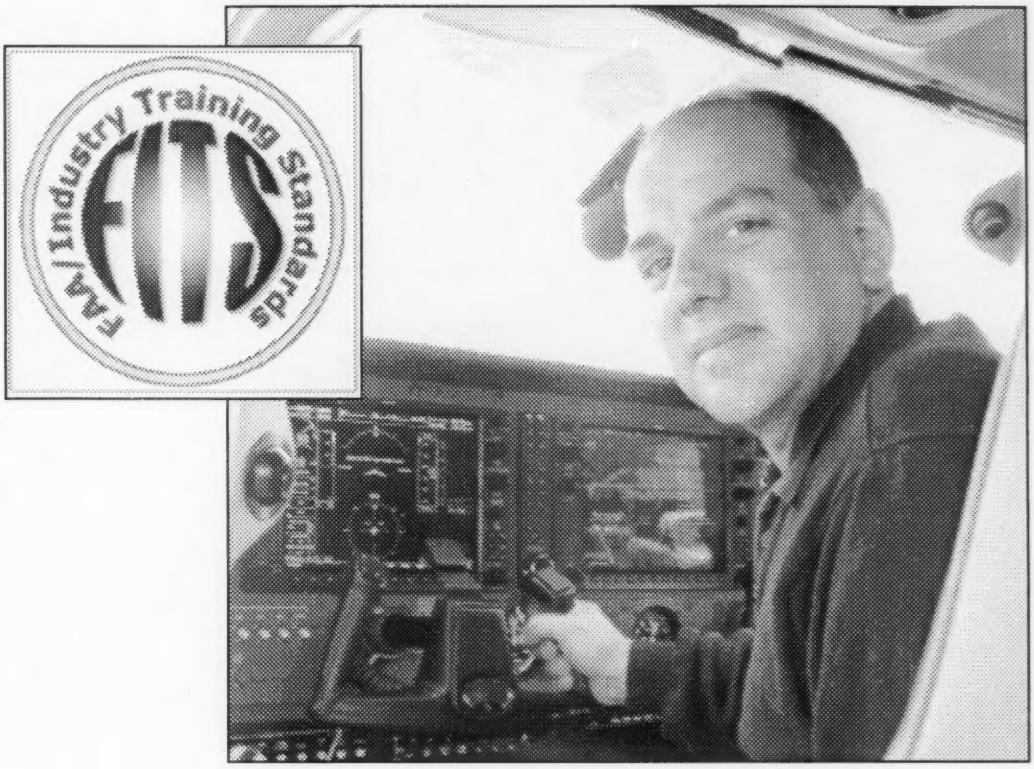
Now we can see why it is so difficult to wrap a basic private pilot training curriculum into a FITS template. We were taught to fly by a traditionally trained flight instructor who took us out to the practice area and beat us over the head practicing stalls and slow flight until we were ready to return to the airport. The next flight we would go do it again and maybe do a few landings. We would repeat this until we were told we were ready to solo. No wonder so many pilots quit flight training right around first solo. Their flight instructors never really incorporated the student into the training process and many of their early flights had no real purpose other than to practice something that seems scary and had no overall objective related to their personal goals. This makes it difficult for them to see the big picture. They lose motivation because they see they have to get through this stage of elemental tasks before they will be allowed to do something useful.

If we were to use the FITS approach from the very beginning, what would be different? First, each and every flight, right from the initiation of training would be custom designed as a scenario, just like a mission. This means the objective of each and every flight is to plan and execute a flight scenario that has meaning and incorporates the tenets of fundamental flight that we wanted to impart all along while promoting multitasking and the application of aeronautical decisionmaking and risk management skills. One might then ask, how can you incorporate slow flight, stalls, and ground reference maneuvers into a scenario template? That becomes the trick to a thorough understanding of FITS on the part of the instructor. We can not completely get away from the elemental form of practicing these critical aspects of flight that the FAA will test using a proficiency standard in order to determine if our student is ready for certification. The important part is to wrap multiple aspects of these procedures into flight scenarios that the pilot is being led through and eventually leads the instructor (in an ideal world) through. This results in several important things happening that are critical to the effective education of complex and multifaceted tasks like safely conducting a flight. The student is involved in the process and understands the big picture right from the start of each flight. Students now feel their training is being conducted in an organized and orderly fashion and can tell at all times where they are along the roadmap leading to their end goal: Certification. Second, the student is taught from the start to multitask and to understand how the bad things in aviation occur when people fail to apply good judgment and aeronautical decisionmaking. This should result in not only safer pilots, but also an improvement in the statistics of upcoming pilots who stick with the program beyond the first solo. These pilots will then become good instructors because their law of primacy will be to teach from a mission or scenario standpoint and the idea propagates.

Winning over the industry with FITS

The question remains: Does FITS work and will people use it once they see it works? Will customers do it willingly, even if it costs them more? Aside from the fact that the many pilots will do it because it makes sense, this depends upon whether the FAA threatens to enact legislative rulemaking requiring a FITS-based endorsement or any kind of endorsement for Technically Advanced Aircraft operations or they otherwise incorporate it into PTS for certification. After all, they did this for tailwheel, complex, high performance, and high altitude aircraft as well as any aircraft having a turbojet engine. The program will also gain respect once people see it work and it does promote safe operations of general aviation aircraft. It also would grow teeth if the insurance industry backs the teaching method after coming to the conclusion that accident statistics improve by requiring thorough training prior to endorsing coverage on the operation of these aircraft by its insured pilots and owners. They have been doing this in the jet world for years. All of these things are departures from what were common expectations in the early days of aviation training when only excess speed and ability to react was the thing one had to train and prepare for. This separated the professional pilots from the rest. This no longer is the case and as GA training organizations start bringing these airplanes into their aging fleets of vintage 70s and 80s training aircraft, they will either recognize it or their insurance companies will premium them out of business. With new technology comes the responsibility to master it. We are now flying aircraft that I call "hands folded in lap" aircraft. We "program" the aircraft prior to engine start, then once in flight, we activate the autopilot to follow the electronic flight plan like a script of a computer program. Our job is to make sure it stays on the script and to be ready to address deviations when required by weather changes, ATC, emergency, or system failure, if and when these happen. Part of our requirement as operators is to use the technology to our advantage when it is to our favor. In order to do that we must understand our systems down to a deeper level than 70s vintage aircraft, so a new training requirement was born that more closely addressed its needs.

From the industry side, training



The author of the article, Mike Gaffney, in the G1000 cockpit. (Julie Gaffney photo)

companies, university training programs, and aircraft and system manufacturers promote a more total learning experience, if it means that they can arguably prevent an accident. From the training and delivery side, the answer to this question is in the interpretation of the FITS program and then getting the instructors to use the program without falling back to old training habits. This sounds like a management issue, a curriculum issue, and a standardization issue, all rolled into one. It is not an easy one to crack either. This is why Skyline Aeronautics in St. Louis chose to get an FAA part 141 Training School course approval from the local FSDO and then go to the FITS team in Washington for FITS approval. By part 141 regulations, a pilot in training has to follow a prescribed program to the letter and then take an approved end of course exam or "graduation check-ride" in order to receive graduation distinction and credit. This would come with an industry recognized and hopefully respected FITS logo on that document. Now, this training program has teeth and meaning. Soon aviation insurance underwriters will officially recognize the program with premium discounts, favorable pricing, and ultimately lower rates for pilots and owners. Then watch competitive training companies jump on the bandwagon. Funny how America works, isn't it?

Practice Makes Perfect

Other than the FITS accepted program I originally designed for our Garmin 1000™ equipped TAA in St. Louis, I have just completed my second program designed to "certify" flight instructors to teach a FITS course using FITS techniques. The first was at Cessna earlier this year and the second was at Diamond Aircraft just recently. All of these programs were accepted by the FITS Technical Team under the direction of the FITS Program office at the FAA. My observations are that a great deal of collaboration must go into getting the program to conform to its intent of being scenario based and student centric. Let me explain. If you take a flight instructor who was taught to fly using the task (PTS) oriented training approach (which basically includes almost all of us in the U.S. and Canada), you have to really work through two major steps to accomplish a true standardization of the instructor. The first is that the instructor must completely buy into the philosophy of teaching through the use of scenarios and must consciously work the process in each and every lesson regardless of whether the curriculum calls for it or not. This means a basic relearning of teaching concepts, which goes

against the laws of primacy for when they originally learned. The second is that they must be standardized to deliver the programs using the FITS tenets and then be continually evaluated and coached so that they can continue to evolve as professional educators using this approach, which is designed to enhance safety and promote effective multitasking in a technology-enabled cockpit. This standardization, such as what I just encountered with the team at Diamond Aircraft, involves predetermined scenario templates that the instructor needs to practice until the evaluator deems them FITS proficient.

Regarding this FITS instructor training, I recently worked with Brent Eddington, the lead FITS trainer from Empire Aviation in London, Ontario, who heads up a FITS training program focused on preparing new owners of Garmin 1000™ equipped aircraft to accept delivery of their new aircraft and then safely fly them away from the factory. We spent days rehearsing FITS training scenarios for the Diamond *Star* Garmin 1000™ "Train the Trainer" program. Both of us come from an extensive education background and we conducted our week-long program in a FITS like scenario oriented format including all of the exercises required to properly prepare a pilot to safely operate their new aircraft. This exercise required putting away our professional and competitive egos and conducting a series of role plays, conducting scenario based training in the classroom in front of procedural trainers and in the aircraft itself. Brent brought in their chief flight instructor and their assistant chief flight instructor to participate in the various role plays throughout the week. We then sat through extensive self-appraisals, not only of our technical knowledge of the subject area we taught, but also our ability to adhere and employ the FITS program to achieve the scenario objective of that ground or flight lesson. Why would professionally trained instructors who fully embrace the FITS methodology need to spend such an exhaustive amount of time practicing it to certify each other? The answer is that it is so easy to slip back into traditional teaching practices that tend to enable the student rather than to teach them to multitask and problem solve.

This is only the beginning as within 12 months Diamond will be delivering their Garmin 1000™ equipped *Twinstar* aircraft; a composite replacement for the 30-year-old Piper *Seminole* as a twin-engine trainer. This is where the factory training process will really be put to the test. Not only will Diamond have people showing up to receive their new aircraft who have never flown a glass cockpit aircraft, but they also may not even have a multiengine certification and the factory training center only has a limited time and budget in order to safely prepare these pilots. We better have our act together by then because soon after will come the very light jets equipped with the same cockpit automation systems, suddenly increasing speed by a factor of two the fastest thing we have now. In our opinion, there is no time to sit and debate the finer details of the FITS program and give it lip service. We must perfect it and then share our experiences with other professional instructors in a collaborative fashion and make sure that our own flight instructors embrace it. If we don't then the directives will be coming from the insurance companies who must underwrite the aircraft and the people who fly them.

So, has it worked for us and the others who have actually implemented it into their training culture like Cessna, Diamond, and UND? This is the final variable that people are watching to see. Middle Tennessee State University is experimenting with a FITS accepted program that combines Private Pilot and Instrument Pilot training into a series of coordinated scenarios leading to certification. This may be the wave of the future, if it works as people believe it will. Why wouldn't it work? The student is taught from the very first lesson to plan, multitask, and make good decisions based upon practiced scenarios approximating situations they will see in the real world of aviation.

In order to implement this program, we have standardized our instructor pilots who show the willingness to first earn a FITS endorsement and part 141 graduation certificate for themselves. This is important. You cannot convince instructors to implement a program, which they themselves have not first had to attend on their own and have no buy-in to change their behavior. This being said, our staff of young professional instructors eagerly signed up for the training and each and every one have attended the intense nine hours of ground school that is a minimum for the Garmin 1000™ program offered for our leaseback rental fleet. They then also took the required minimum three scenarios and ended with a graduation ride and chief instructor standardization. We then follow a process of continual improvement to make sure that the instructors not only keep up with changes in the technology, but they keep up with changes in the FITS methodology, as well. This is accomplished through mandatory training and once a month safety meetings designed for instructor standardization.

Right now, the FITS approach seems to be the best way that we can effectively prepare pilots to fly these aircraft as the technology continues to race ahead of our ability to keep up with outdated training techniques that were designed and perfected in a simpler day and time. So, are we ready for FITS based scenario centric training like this? Are you?

Mike Gaffney is an FAA Aviation Safety Counselor, A&P mechanic , ATP pilot with a CFI, CFII, and CFMEI and over 3,000 hours to his credit and is a Cessna FITS Accepted Instructor (CFAI) for the Garmin 1000™ and factory trained in Diamond Aircraft. He was just designated a NAFI Master CFI by the National Association of Flight Instructors, and is the President of Skyline Aeronautics at Spirit of St. Louis Airport.

Misunderstanding Part 91.175

by Cody Johnson

An aircraft crashed several months ago while executing a locator/distance measuring equipment (LOC/DME) approach. The aircraft descended to the minimum descent altitude (MDA) then purportedly the pilot reported on the Cockpit Voice Recorder (CVR) that he "had the approach lights." The aircraft continued a descent below the MDA and struck a rising tree-covered hill a few miles from the end of the runway.

In the course of the investigation, the National Transportation Safety Board (NTSB) began evaluating Title 14 of the Code of Federal Regulations (14 CFR) Section 91.175(c), "Takeoff and Landing under IFR." (See sidebar on next page) They have asked the FAA to explain why the rule has, what they believe, an unsafe provision. Specifically, the rule states that once a pilot, who is established at MDA, sees the approach lights he can descend below the MDA to 100 feet above the touchdown zone elevation(TDZE):

This would lead one to believe that a pilot could descend below the MDA several miles from the end of the runway based on the fact that he saw some approach lights in a low visibility situation (night/IFR/rain). That in fact is not the intent of the rule. The rule contains many provisions and extensive criteria born over years of experience and accidents.

For example, the 100-foot restriction only applies when using the approach lighting system. The reason is simply that the approach lighting system isn't the runway; it's the environment prior to reaching the runway. You need something else that will verify positive contact and let you know where the end of the runway is. If you are only using the approach lighting system and don't have the runway environment itself in sight, you need either the red terminating bars or the red side row bars to go below 100 feet above the TDZE.

If you have any of the other elements indicated in 14 CFR 91.175(c)(3), you do not have this restriction. Again, the aim of this regulation is to require you to have positive contact with the runway and to be able to identify the threshold. If you can see the threshold lights, touchdown zone lights, runway lights, etc., then you are seeing something that is beyond the threshold. If you are looking only at approach lights, you have no exact idea of where the runway actually begins, hence the requirement.

If you have the threshold, threshold markings, threshold lights, runway and identification lights (REIL), visual approach slope indicator (VASI), touchdown zone (TDZ) or TDZ markings, TDZ lights, runway or runway markings, or the runway lights, you are not restricted to the 100-foot limitation.

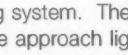
If you reach decision height (DH) or the applicable MDA and have the approach lights in sight, you may continue on your descent, using those lights until reaching 100 feet above the TDZ elevation. At that point, if you do not have the requisite red terminating bars or side row bars, you are obligated to perform a missed approach. However, if when arriving at 100 feet you have other elements visible as described above, then you may continue, as you are no longer using only the approach lighting system. The restriction applies when using the approach lighting system only, for your visual reference. It's important to have this provision for those non-precision approaches (VOR/ADF) with relatively high MDAs (500-700' height above touchdown or HAT) so a pilot has a reasonable chance of complying with Section 91.175(c)(1). (See sidebar.)

Also applicable to this question is the very important issue of what approach lighting systems (ALS) use, red terminating bars or side row bars. You need this information when planning the approach, and it is provided with the approach chart. The ALSF-1 (with sequenced flashing lights) provides red terminating bars, and the ALSF-II provides side row bars. The runway in question in this accident is equipped with a Medium Intensity Approach Light System (MALS), which contains a green terminating bar and a sequenced flasher—no red lights!

Section 91.129(e)(3), Operations in Class D Airspace, is also extremely applicable in this accident. It says, "An airplane approaching to land on a runway served by a visual approach slope indicator shall maintain an altitude at or above the glide slope until a lower altitude is necessary for safe landing."

If the pilot followed this rule he would be alive today. Runway 36 at Kirksville is equipped with a VASI.

Whether it was working, or working properly, is a job for the investigators. But Section 91.175 was not the basis for this accident.



Coby Johnson is an Aviation Safety inspector with Flight Standards Flight Technologies and Procedures Division.

§91.175 Takeoff and Landing Under IFR.

(a) Instrument approaches to civil airports. Unless otherwise authorized by the Administrator, when an instrument letdown to a civil airport is necessary, each person operating an aircraft, except a military aircraft of the United States, shall use a standard instrument approach procedure prescribed for the airport in part 97 of this chapter.

(b) Authorized DH or MDA. For the purpose of this section, when the approach procedure being used provides for and requires the use of a DH or MDA, the authorized DH or MDA is the highest of the following:

(1) The DH or MDA prescribed by the approach procedure.

(2) The DH or MDA prescribed for the pilot in command.

(3) The DH or MDA for which the aircraft is equipped.

(c) Operation below DH or MDA. Except as provided in paragraph (l) of this section, where a DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, at any airport below the authorized MDA or continue an approach below the authorized DH unless—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and for operations conducted under part 121 or part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach being used; and

(3) Except for a Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The runway end identifier lights.

(vi) The visual approach slope indicator.

(vii) The touchdown zone or touchdown zone markings.

(viii) The touchdown zone lights.

(ix) The runway or runway markings.

(x) The runway lights.

200-KNOT AIRPLANE MEETS 90-KNOT MIND

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"Two Hundred-Knot Airplane Meets 90-Knot Mind." A scary movie? No, it's called a transition, a checkout, and as the pilot told me, "It's just something the insurance company requires." Good for them, I thought.

Learning to fly calls into use, sometimes for the first time, a few particular skills. They can be lumped under several categories like hand to eye coordination, motor skills, anticipation, preparation, and what we pilots call "Getting ahead of the airplane." As an instructor, I am thrilled when I get a student who rides a motorcycle or a personal watercraft, drives a racecar, or a multitude of other things that require the use of your mind and hands in making quick decisions.

This transition, as it is called, has now reached such a level that an instructor could make a living from it alone. Using just one example, naming an airplane we are all familiar with, transition to one of the new fast Mooneys is 25 hours of training with an instructor. And this takes us to my latest victim who sold his *Warrior* and got a Mooney 252 (capable of doing 252 miles per hour).

On the first trip, with a trip around the pattern at the end of some very fast steep turns, slow flight at 160 mph, and a stall that he recognized and I missed, we were going to do a few touch and goes when on downwind I noticed we were doing 150 mph. I asked him what gear down speed was, or approach, or any of those V things that were safely tucked away in the back of the Mooney in the Flight Manual. Receiving no verbal response, but in the time it took him to think and take a look at me, we were on an extended downwind and being asked by the tower if we were still

going to land.

I answered for him by saying, "Not this time. Thank you, though, for being concerned."

We left the pattern to regain some composure, and I asked him to take us to a nearby VOR airport and shoot the approach. This would give us some extra time to work on speed management. He immediately started to work on his panel with GPS, HSI, auto pilot, two VOR heads, ADF, fuel management system, and an elaborate flight director of some kind. I was sure it had all come out of a "Star Wars" movie. After traveling 34 nautical miles with him heavy on that panel, cursing, explaining, redoing, I told him that we were seven miles past the airport and 12 miles to the right. My equipment (two eyes) showed us right over the city that the airport is named after, and it just happens to be, according to the chart, 27 DME from our home base and 12 miles that-a-way.

"Well, it's all new to me," he said, and I had picked an airport that was not readily available in his data bank. I told him, "Okay, take me back to home base and let's do one or two soft field landings and takeoffs." While all this is taking place, we have traveled 19 miles further away from civilization, and while he had been talking, I had finally gone through the entire fuse bank and found the two that I wanted, Panel Avionics and Landing Gear.

As I pointed and he looked, both fuses were pulled and all got real quiet. Not wanting to leave our state completely, I told him to turn 180 degrees so we at least would be headed toward something recognizable to me. Now in a total dither, banking, cursing, flipping, turning, and more cursing, nothing worked but the compass and the turn & bank coordinator.

"We'll never make it back!" he said. I said, "What do you mean 'we'?"

We did make it back and sure enough he threw the gear handle, talked on the radio, no GUMPS, no look at the floor indicator, and still doing about 140 when he announced, "Speed Brakes coming out." As I slid forward under the seat belt and out of my seat, he turned left base at 140 and I said that maybe we should do GUMPS now. "Too close to the runway for small details," he said. I then told him (and I really like to do this), "Your gear is NOT down!"

A quick look at the floor light showing RED, a quicker check of the panel as I put the fuses back in, gear down in plenty of time, and an awful landing, because he said he was going too fast because the airplane was too busy. The guy at the insurance company, who said 25 hours ought to do it, probably flew a *Warrior* also.

If you are thinking of trading up, take the time to get ready for this transition process and at least be smarter than the instructor you are going to have to spend $500 with, or more if you are not ready. My guy got through it just fine, and so have many others who buy the faster and more complex aircraft we are seeing today. Getting ready to fly this new airplane is no different from preparing for any other aircraft. It takes a little time on your part and a little reading and a bit of cockpit organization, then another bit of planning for whatever you are planning to do.

Flying a 200-knot airplane with a 90-knot mind will get you hurt. Let's not let that happen. Airplanes are so deceiving in that speed is not readily apparent when you look out the window. The rush you feel in a car or on a motorcycle is really not there simply because you can't see objects whizzing by or feel the speed itself without making contact with the ground. But it is there and it can be just as deadly if you are not in total control.

Getting ahead of the airplane should always be the pilot's battle cry, and now they are adding cockpit resource management, sterile cockpit and decisionmaking to us little old airplane pilots. Let me tell you something, Zeke. If you're flying over 200 miles per hour you are no longer just one of the boys. Son, you are moving!

Need help in your transition? Ask the insurance company who has been doing the work for them. Ask the manufacturer. And certainly ask the person who has an airplane like your brand new one, "Who did you get to check you out for the insurance company?"

The guy in this story finally turned out to be a great pilot. He finally learned that his airplane will fly at just a little above 60 knots with him still in full control and will certainly do the speed that Mooney says it will. He just finished getting his commercial license with me, and I hope he will become an instructor. He truly understands the transition now. I watched his face as we did steep turns at 55 degrees, Lazy Eights, Chandelles, and Eights on Pylon, soft and short field takeoffs and landings, and he was "one with the aircraft." Patience and training pays off. The biggest compliment he paid me and my method of teaching was, "I really feel comfortable flying this bird now, at any speed." I felt comfortable riding with him, too.

Speed doesn't kill—stupidity does! I'll see you at the airport! Always remember that accidents are caused and therefore preventable! Got some questions about transition training that I can answer for you?

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Determination, Communication, and the Worst Disaster in Aviation History

by Scott Gardiner

The following article highlights the thoughts and opinions of the Seattle FSDO's Safety Program Manager Scott Gardiner and is based on his 30 plus years of aviation experience.

I was a full-time flight instructor for seven years before I joined the FAA in 1977. In those days most of my studies concentrated on the federal aviation regulations, the *Aeronautical Information Manual*, and the Practical Test Standards (*Airman's Information Manual* and Flight Test Guides in those days). The first time I ever studied national aircraft accidents on an ongoing basis was after I joined the FAA. In my accident studies, several consistencies jumped right out at me. For example, pick a year. Pick any year. Landing accidents, many caused because pilots refuse to go-around no matter how badly the approach is going, is always the number one cause of general aviation airplane accidents. The number one cause of fatal general aviation airplane accidents nation wide is always "continued VFR into deteriorating weather." (Density altitude is the number one cause of fatal airplane accidents in the seven northwestern states, not including Alaska). Running out of fuel always ranks in the top ten.

One question kept running through my head. "Why?" Why do we keep making the same dumb mistakes over and over again? The NTSB makes the accident statistics available on line. The FAA does seminars all over the nation. *Flying* magazine does, "I learned about flying from that." The AOPA Air Safety Foundation does its seminars all across the nation. And yet, year after year, the probable causes really never seem to change. About 81 per cent of general aviation airplane accidents are caused by pilot error. About one-half of those are caused by skill errors (loss of competency, lack of currency, etc.). But the other half of the pilot error accidents is caused simply by bad mental mistakes. Why? Most of these accidents are easily avoidable. Why aren't we learning from the mistakes of others? Why don't we change the way we fly and avoid the well-known pit falls?

Searching for the answer to "why" has taken me on a 15-year search for knowledge (a long trip for me), but now I honestly think I know the answer. I don't claim to be smart, and I don't claim to understand all I know about the subject. I assure you, I am NOT a trained psychologist. But I have spent my entire adult life involved in the flight training of adults, and I must admit I do find human behavior fascinating. Recently, several things presented by a number of different people clicked in my head, came together, and suddenly it all made perfect sense. It is an insight that I truly believe can reduce aircraft accidents. We are talking human behavior here, so nothing is guaranteed. Of course, there are exceptions. But as I go through life observing people, I gotta tell you, I see it a lot.

Here's one that really has nothing to do with the subject at hand, but I find it fascinating in that it shows just how similar we pilots are. Have you ever had a dream where you were flying an airplane very low (maybe 15 or 20 feet) over a busy city street? What appears to be hundreds of power lines cross the street above your airplane. You fly along looking for a space between the lines with enough room that you can zoom your airplane up to freedom? But there's never enough room. Have you ever had that dream? I'll bet you thought you were the only one who ever had that dream. But ask your pilot friends. I'm not sure what the significance of the dream is. And I don't understand the meaning of the dream. But I find it fascinating how similar we all are.

Although I am writing this in the first person, these are not original thoughts. They come from a variety of sources; I am simply the one combining them into this article. One of the most significant of the sources is a videotape of a two and a half hour lecture delivered in 1981 by a gentleman named Morris Massey. During the sixties, seventies, and eighties, Mr. Massey traveled the nation delivering his message to corporations on the subject of internal company communication. The title of his lecture is, "What you are is where you were when...when your personality matured."

It seems that in the 1960s, '70s, and '80s, a lot of managers who were in the 50 to 65 year old age group were having trouble motivating 20-year-old new hires. There was a huge generation gap. The old timers just didn't understand how to motivate the younger new hires. Mr. Massey's message explains why.

It seems our basic, gut level, core value systems get sealed into our personalities when our personalities mature, which happens somewhere between age 10 and age 15. Located within your core value system are things like what you consider to be right or wrong. And what you consider to be good or bad. Also, what you consider to be normal or not normal. How you look at and deal with the world. How you deal with people. Whether you are basically an optimist

or basically a pessimist. What battles you are willing to fight, and which are not even worth worrying about. These basic, gut level, core values are sealed in our personalities when our personalities mature. Whatever was important in your family, and whatever was important in the world when you were between the ages of 10 and 15 has a huge influence on your basic personality makeup. Hence the title of Mr. Massey's lecture. "What you are is where you were when...when your personality matured."

The problem in the '60s, '70s, and '80s was that the basic, core values of the 50 to 65 year old managers where formed during the Great Depression. During those years, those who had jobs considered themselves very fortunate indeed, and they would do absolutely anything to impress the boss, to keep the business profitable, and to keep their jobs. Employees were as dedicated to the future of the company as were the owners. They knew there were 50 people on the street waiting for any job opening, and they did not want to be out there with the unemployed. If a piece of equipment broke towards the end of the shift, workers would gladly stay around after hours and get it fixed before the next shift arrived in the morning. If it kept the company profitable, it had to be done. And they would stick around as long as it took to get it fixed, even if they were not paid to do so!

Fast forward to the new hires who were 10 to 15 during the sixties and seventies. Jobs were plentiful. The economy was good. If the 60-something manager approached a 20-something employee and asked them to stick around after hours to fix equipment, the new hire would laugh and say, "When my shift is over, I'm on my own time, and I certainly am not going to waste my time here." The manager would counter with, "I'll give you time and a half." To which the new hire would answer with a laugh and, "I wouldn't hang around here after hours for triple time! I gotta go out and have some fun." The manager fires back, "If you don't stay and fix it, I'll fire you!!!" To which the new hire responds, "If you are going to fire me, you better do it quick, I'm about to quit. There's another job waiting for me around the corner and I certainly don't need to hang around here and be hassled by you!"

Our core values are sealed into our personalities when we are 10 to 15 years old and influence our thinking forever. We cannot change it. OK, OK, OK. The experts say that if you really, really, really want to change, and are willing to undergo several years of psychological testing and therapy, for every 100 people who really, really, really want to change there will be one or two who actually can change. But the rest of us will take our basic, core, gut level values with us to our graves. You want proof? Go visit your parents' or your grandparents' garage or basement. There you will find old rusty junk and parts to things that don't even exist anymore. Things like badly scratched 45-RPM records. Things like rusty blades for a rotary, push, lawnmower. Things like shovels with the handles broken off. Why do they keep this stuff? Because they were 10 to 15 years old during the Great Depression or they were raised by parents who were 10 to 15 during the Great Depression. And they can't throw that stuff away. They can't throw anything away. Their basic, core, gut level values won't let them throw anything away. Fifty years later, they are still keeping that stuff because keeping stuff is burned into their personalities. Besides, "You never know when you might need it."

In the spring of 2003, I was fortunate enough to sit through a class taught by Mr. Mike Alverado. He presented some fascinating things about the makeup of pilots. It seems we are rather a unique group of people. For example, compared to the general population of the United States, an unusually large percentage of pilots are the first child born in the family. Ask your pilot friends. Mr. Alverado theorizes that first-born children are raised by parents who have no experience raising kids, but they are sure of one thing – they are dedicated to raising a perfect human being. As a result, parents have higher expectations of the first-born child. First-born children are encouraged more than their siblings. And first-born children are given more responsibility than their siblings. As a result, first-born children come through that 10 to 15 year age range being very focused, very goal oriented people. And they are accustomed to achieving those goals. Whether or not you are a first-born child, you as a pilot are a focused, goal-oriented person, confident that you can be successful in achieving your goals.

This can be a wonderful personality trait. It helps us get things done. For example, saving up money to buy flying lessons. If we couldn't set that goal, focus on it, and work until it was successfully accomplished, we would never have accumulated the money to complete pilot training. If we couldn't set a goal, focus on it, and work until it was successfully accomplished we never would have passed the knowledge test. It's a multiple-choice test, but you've got to admit it is the toughest multiple-choice test you ever took. If we didn't have the basic core values we do, we never would have passed that test, and we never would have become pilots. Our basic core values of dedication, determination, and focus, help us achieve goals.

And they can kill us! Imagine, you are flying home to Boeing Field VFR from (it really doesn't matter where) say somewhere in Montana. You are over eastern Washington, flying in severe clear VFR weather. But heading west you notice that clouds are obscuring the tops of the Cascade Mountain range. You have decided that you will be home before sunset. So, even though the weather ahead looks daunting, do you land somewhere in eastern Washington and wait out the weather? No. There is some little voice inside encouraging you to get this flight done. Something is pushing you to find a way to get the airplane through. It's that focused, goal-oriented, success, part of our personality that says, "It might be risky, but I can do it." So, you go

down low and try to sneak through the pass. Another needless "continued VFR into deteriorating weather" accident. The problem is our goal-oriented, success-oriented personalities can drive us to take unreasonable risks. The result is a kind of a "tunnel vision" focus in which we don't realize or even care that we are taking an unreasonable risk.

On another day, another cross-country, you are about an hour from destination and low on fuel. You consider landing short of your original destination to refuel. But then you think, "It could take 45 minutes to descend, fly the pattern, taxi to the pumps, find someone to refuel the plane, taxi back out, takeoff, and climb back up to altitude." So, rather than descend and refuel, you focus on getting the airplane through to the original destination. That's why running out of fuel accidents occur over and over again. It's in our personalities. It's not like us to fail to meet our intended goals. Something inside is pushing us to take the unreasonable risks.

Yet another flight, and on short final, you are lower than you would like, the airspeed is slower than you would like, and the crosswind is really blowing from the right. You look out the window and think, "Boy, I'm really not even close to being on target here." Do you think to yourself, "Well, it's fourth down and forty eight yards to go. In situations like this, we punt. I better go around?" No!!! We focus on the problem and try to find some extreme way to make it work. Another needless, crosswind landing accident.

Are these accidents happening because we cannot read the METAR and TAF reports? No! Do they happen because we do not know how many gallons of usable fuel the airplane carries? No!! Is it because we do not know the maximum demonstrated crosswind component of the airplane? No!!! They happen because buried way down deep in our personalities we are accustomed to setting goals for ourselves and finding ways to successfully accomplish them. It is a personality trait that helps us get stuff done. It's a personality trait that we cannot change. And left unchecked, it can convince us to take unreasonable risks, even the ones that end in accidents.

In fact, the worst accident in aviation history is primarily attributed to just such a personality trait in the captain of a 747. On Sunday, March 27, 1977, two 747's collided on the runway at Los Rodeos Airport on the Island of Tenerife, one of Spain's Canary Islands. 583 people were killed. To this day, it is still the record. I use this accident as an example because it is well-documented and it shows how pilot's personalities, when focused on a goal, can persuade them to take unreasonable risks. Although the airplanes involved where 747's, it could easily have happened to pilots of light airplanes too.

One of the many strange things about that day was that neither plane set out to land on Tenerife. The airplanes, one a Dutch KLM 747 and the other a Pan American 747 were chartered flights taking vacationers to the Canaries, the European equivalent of our Hawaii. The original destination of both planes was the Las Palmas airport, 50 nautical miles from Tenerife. However, as the airplanes were starting their descents, a bomb exploded in the flower shop in the Las Palmas terminal building. Shortly after the explosion, someone called the airport manager, took credit for the bomb, and threatened that there would soon be another one. The airport manager closed the airport for a bomb search. ATC diverted many inbound planes, including both 747s, to Tenerife.

The Los Rodeos airport, not accustomed to so many airliners landing, soon became saturated with parked airplanes. Although the runway was clear, airplanes were parked all over the parking areas and adjacent taxiways. After a two-hour bomb-sniffing search found no evidence of a second bomb at Las Palmas, the airport opened back up for normal operations, and the airplanes planned for departure from Tenerife.

But the two-hour delay left the crew of the KLM 747 short on duty time, and the Dutch had just recently increased the penalties for exceeding duty time. If the KLM captain could get his 747 off the ground soon, he could get to Las Palmas within his allotted duty time. If he could not take off soon, he would be forced to spend the night on Tenerife, with his airline responsible for finding hotels for all the passengers, and for paying all their overnight and meal expenses. Also, they would have to deal with angry passengers who would miss their cruise ship connections. The captain was in a rush.

Both 747s were parked at the west-northwest end of the airport, and the winds favored runway 30. Since the taxiways were clogged with parked airliners, the plan was for the KLM to back taxi on the runway, with the Pan Am following about a mile (half

FAA's Safety Hotline 1-800-255-1111

FAA's Safety Hotline operates Monday through Friday (except holidays) from 8 am to 4 pm ET. It provides a nationwide, toll-free telephone service, intended primarily for those in the aviation community having specific knowledge of alleged violations of the federal aviation regulations. Callers' identities are held in confidence and protected from disclosure under the provisions of the Freedom of Information Act.

the runway length) behind. The KLM would taxi to the departure end of 30, turn around and wait. Meanwhile the Pan Am would taxi about three quarters of the length of the runway and pull off onto the taxiway. Then the KLM would takeoff, and only then would the Pan Am 747 taxi to the end of runway 30.

It was a good plan. Both airplanes were using the same tower frequency. But, as the airplanes were back taxiing on the runway, the fog blew in and dropped the visibility nearly to zero. It was so dense that neither crew could see the other 747, and the tower operator could see neither the airplanes nor the runway. The situation required some good, coordinated communication using words and phrases, which go well beyond those defined in the aviation English pilot/controller dictionary. Keep in mind too, that the situation involved a U.S. crew, a Dutch crew, and a Spanish tower controller, all trying to communicate in English.

As the KLM 747 reached the departure end of runway 30 and turned around, the Pan Am 747 was approximately at the mid field position, taxiing very slowly in the dense fog. The KLM lined up on the centerline and the captain, in his rush to get going, started to advance the throttles. The KLM co-pilot stopped him, explaining that they had not yet received their IFR clearance. The captain relented, closed the throttles, and told the co-pilot to get the clearance.

The tower delivered the IFR route clearance to the KLM, but offered no takeoff clearance. The tower would not have issued the takeoff clearance because the Pan Am 747 was still on the runway. As the co-pilot was reading back the clearance, the captain again ran the power up, stated, "Let's go," and called to the flight engineer to, "Check thrust." This accident was in the days before Crew Resource Management, when co-pilots were considered quite inferior to captains. The KLM co-pilot knew they had not yet received their takeoff clearance. He had stopped the captain from taking off once, but probably thought he could not get away with it again. So, rather than insisting the captain stop the takeoff roll again, the co-pilot blurted into the mic, "We are at takeoff."

It is my understanding that the Dutch speak pretty good English, but that they never use "ing" at the end of any word. If you ask someone where his or her spouse is, the answer would not be "working." It would be "at work." The tower, interpreting the KLM transmission to mean they were ready for takeoff, replied, "Okay...standby for takeoff...I will call you."

The Pan Am crew, hearing the "Okay" part of the tower's transmission, were understandably alarmed. In a rather excited voice the Pan Am co-pilot transmitted, "We are still taxiing down the runway!" Unfortunately, the Pan Am transmission "stepped on" the last of the tower's transmission and all the KLM heard the tower say was, "Okay," followed by the all too familiar radio squeal.

The tower operator had NOT issued a takeoff clearance to the KLM and would not have until he was certain the Pan Am was off the runway. The tower called the Pan Am, "Pan Am 1736, are you clear of the runway?" The Pan Am answered, "Negative. But we will report when we are clear."

This transmission was clearly audible to the KLM pilots. However, by this time they were 20 seconds into their takeoff run and intensely concentrating on takeoff duties. Only the KLM flight engineer took in the possible significance of the two transmissions. He asked his pilots, "Did he not clear the runway, the Pan American?" Both pilots emphatically answered, "Yes, he did!"

A few seconds later, the Pan Am caught sight of the KLM lights piercing the fog. The Pan Am captain desperately pushed all four throttles to max power and turned left to exit the runway. When the KLM saw the Pan Am on the runway, they tried to lift their 747 over the Pan Am. But it was too late, there was not enough room. The KLM 747 ripped the entire upper third of the Pan Am fuselage off, igniting fires throughout the Pan Am. The KLM fell to the runway and the entire airplane burned up. No one aboard the KLM airplane survived. Only 61 from the Pan Am survived.

The Spanish were the official investigators in this accident. Although U.S. and Dutch investigators were allowed to participate, they did not determine probable cause. The Spanish concluded that the accident was caused by the KLM commencing its takeoff roll without a takeoff clearance. The Dutch concluded that it was a simple misunderstanding between the KLM crew and the tower. They said their captain "thought" he had a takeoff clearance. Communication clearly played a role in this disaster. But I believe it was the mistake of the KLM captain, focused on departing in a hurry, even though he did not have a proper takeoff clearance, that lead to the disaster. A mistake made because of his "tunnel vision" determination to get off the ground in time to arrive at Las Palmas before running out of duty time. I believe it was the "can do" part of his personality. It was his "get it done at all cost" mentality that created the opportunity for disaster.

The scary part is, we've all got it in us. If we didn't, we never could have become pilots. I now believe it is the root cause of most of our avoidable "pilot error" accidents. I believe it is the reason we press on into deteriorating weather. I believe it is the reason we continue toward destination even though we are low on fuel. And I believe it is the reason we refuse to go around when common sense says going around is the only reasonable thing to do. My hope is that if we can understand that part of our personality, maybe we can recognize when it starts to sneak up on us. And if we can recognize it, perhaps, when we really need to, we can do something to control it.

May you always find VFR and tailwinds.

Scott Gardiner is the Safety Program Manager at the FAA's Seattle Flight Standards District Office.

Tales from an FAA Inspector

by Al Peyus

And All I Wanted To Do

Was Go Have Breakfast!

I got the call at 8 a.m. this morning. My friends were getting ready to head over to the advertised pancake breakfast at the airport that is about 100 nautical miles away from me. They were only 25 miles from the airport and decided to drive over because it was so close. They said it was clear, sunny, cool (temperatures currently in the high 40's and going into the low 50's for a high), and that I should hurry and get over there because it was such a beautiful day and lots of people were expected!

Now I am really excited and pumped to get there! We have been talking about this little fly-in for most of the last two weeks. The local weather has been full of nasty wind and rain for the past three weeks and we really were looking forward to getting back into the sky! I hadn't had a chance to fly in over two months!

I grabbed my flight bag, coat, hat, and money and headed for the front door. Reality hit as I opened the front door and started outside. FOG! I could barely see the end of my driveway! This is a real bummer! After a few minutes of grumbling, complaining, and moaning, I decided that I really should start looking at what it was I was intending to do and how. Was grabbing my flight gear the proper way to do all that was required for a preflight? So, back to square one!

How many of us have started to head to, or even arrived at the airport, with the intent to fly because it was what you had wanted and planned to do for quite a while and at the same time thinking about that fun fly-in everyone has been talking about? It is so easy to do. Your friends call and tell you the weather is great there and the fun is about to start and that you had better hurry over because there was little room left to park airplanes. Off we go, grabbing the gear and heading for the airport all the while thinking about and looking forward to the great trip and all the fun to be had as soon as we arrive!

If we are unlucky, we make it out our front door and start toward the airport. If we are really unlucky, we made it through take off and a few miles into the flight before the weather shows its ugly face or we realize we have left out a very important part of the preflight: charts, approach plates, airport information, etc.

So where did I go wrong this morning?

My eagerness to get to a location that has been discussed for a while and to do something I would really like to do had clouded my judgment. To further exacerbate the problem were friends who called and told me that the fun was about to begin, the weather was great (at their location!), and why wasn't I there with them yet? The excitement of the planned trip, the notice of clear and perfect weather, and the draw of friends telling me to hurry over so that I would not miss a second of the fun can start us down a path that I would normally never travel! Peer pressure is a powerful drug that has hard implications even long after I have left my teenage years behind me!

Let me start from the beginning and see if I can point out what did happen versus what should have happened.

Just because my friends were 75 miles away and were in beautiful weather does not mean that my weather for departure was going to be the same! My eagerness to get to the pancake breakfast was driving the urge and desire to get there! It was also blocking the normal patterns I would follow before I finally decide to go to the airport to check out the airplane. So, what did I do wrong?

To start with, taking someone else's weather description for MY weather was not good. Even going as far as starting to gather my flight gear

without further looking into the flight was a gross error in judgment! And I know better! Never allow eagerness of others or the desire for a planned engagement take over when training and experience is contrary!

My first step should have been to check in with a weather briefer! What was the weather at least at my departure, destination, and possible alternate airports? What about en route weather? While I was at it, what about special use airspace? Were Temporary Flight Restrictions (TFR's) being placed between my destination and me? If so, how long, what areas, and what altitudes where they?

Now that I know the weather, what about me? Was I fit to fly? Have I checked my own personal limitations? Was I within what I had programmed as my own limits for flight? Was I rested enough to head off for a long day that was going to include friends, eating, and having fun before I was going to head back to home? The FAA has a great little pamphlet that helps pilots to set personal limitations to keep them from going off into the wild blue yonder stretching their own limitations and experience. It is called "Personal Minimums Checklist" and can be found at <http://www.faa.gov/education_research/training/fits/guidance/> along with "Personal and Weather Risk Assessment Guide." We all should be using them!

Not only should I have checked my personal limitations, but what about me? Was I taking any prescribed medication that would affect my flying skills and judgment? What about the "over the counter" medication for the allergies I keep fighting? Are any of them going to interfere with me on this flight? Will the sinuses cause a problem with my equilibrium that would invite some unplanned excitement along the way?

The weather calls for Instrument Flight Rules (IFR) for the first portion of the flight to the breakfast. The destination is forecast to have near perfect weather until around 1400 hours local. Then there is the possibility of scattered thunderstorms coming in with rain, hail, and lightening! Now that made me sit up and take notice. I had forgotten what autumn weather can be like. This is my first flight after the "official" run on summer! Am I ready for a day of potential hard IFR flying after a day of eating and partying? When was the last time I flew IFR? When was the last time I was with an instructor to check my IFR skills? Does this all meet with the personal limitations I have set for myself?

Before I even consider taking off, am I current to fly IFR? It has been two months since my last Visual Flight Rules (VFR) flight, but what about IFR? While looking at the weather again I begin to ask myself is that really enough to make me safe to handle this flight? I know it makes me legal and "current" but does it make me competent?

Although the flight is going to be about one hour for each way, and I can carry a full tank of gas, what if I need to divert because of the thunderstorms? First I need to understand where the storms are going, how fast, and how severe. Is there a way I can fly around them if necessary? How long will that take? Where will that take me? If I have to set down at an alternate, will there be fuel available and someone to pump it?

Well, since I am only going to be in the weather at take off for the first 1,500 feet and then clear all the way to the destination I feel good about that part. The flight home might have Instrument Meteorological Conditions (IMC) only on the en route portion so that also seems doable to me right now. And, more importantly, it falls into the safe area of my personal limitations! So far so good! So, what else do I need to check?

Oh, yeah! The airplane has limitations also! There are several items I need to check on it to make sure it is safe, current, and legal to fly VFR and IFR! Let me check the VFR stuff first. It's airworthy. The latest maintenance (the annual) was accomplished last month. That took two weeks that kept me from flying for part of the past two months! The ELT battery was replaced just before summer started so that is good. The radios work great and the navigation, although old fashioned, still does the job. So, VFR I am OK.

For IFR, what else do I need to make sure is checked? That's right! The pitot-static system, the altimeter, air speed indicator, and vertical velocity system need to be checked by maintenance. Yep! That was signed off last year during the aircraft's annual and is good for one more year! So, what about the aircraft's VOR? When was the last time I checked the VOR accuracy? Well, thankfully there is a VOT checkpoint on the field I can use at my home airport before I head for the departure runway! I will make a mental note to do so and log it in the VOR folder I keep in the cockpit.

That takes me down to my charts, and approach plates. Are they current and do I have all that I need for the flight? Let's see. I need departure and approach plates for both my departure and arrival airports and at least one other alternate airport. Do I have those and are they current? What information is on the plates that tell me if there are special actions required to either land or takeoff from any of them? Do I need to plan on a special climb gradient or are there obstacles I need to be aware of? I had better take a closer look at each plate for each airport just to make sure because right now I have no idea what one I will be using.

I guess I am ready to head to the airport now. I have all my gear. The weather briefing is complete. I have checked every thing against my personal minimums and limitations and am still good to go. I know what inspections have been accomplished on my airplane and what is needed for the IFR portions of the flight. My flight bag has all the necessary VFR and IFR navigation departure, approach, and en route plates, and charts needed for today. And I have had the good sense to tell my wife when I am to depart, where I was going, and when I was planning to return. I think I have the

"myself" covered! Now I am off to the airport to check out the airplane and make sure what I think I know is correct!

After my preflight inspection I called the weather briefer one last time to make sure there have been no changes. Not only changes in weather but airspace use and those pesky TFR's. No changes! That's great! My tanks are filled with the proper grade of aviation fuel (no one snuck in Jet-A or tried to put auto fuel in the tanks) and the sump drains were properly checked. One last stop to the restroom and I am ready to head off to a great pancake breakfast!

And to think that things almost started off on the wrong foot. I came close to getting myself into a situation that I would not have appreciated. It all started because my friends and I have been talking about and planning to attend this fly-in for almost a full month. We were excited it was coming around and were ready for it! At least I thought so. It was hard to stop and think like a professional pilot when the friends called and stated telling me how great the weather was and how fantastic things were looking for the breakfast. Just the incentives I needed to jump the gun and start off on a trip that would have been very ill planned and prepared! I could have gotten into the airplane without the IFR plates and charts, or flown off with little regard to the airplane's required checks for IFR flight. In the middle of scattered thunderstorms is not the place to find out the altimeter, airspeed indicator, and/or vertical velocity system was not up to the flight!

There is no record or historical data to show us how many flights that ended in unfavorable situations have started this way. But we can only surmise some have! So what can we do to stop it from happening to us? Our best opportunity lies in our bag of tricks that include training, expertise, common sense, and a professional attitude toward all flights. We need to be able to have the professional ability to set aside the prodding and urging of friends and associates trying to get us rushing off to the airplane. We know what must be accomplished and in what order. We have been trained to make everything we do in aviation in a correct, proper, and methodical process when preparing for and initiating a flight.

We must always be ready to check the "myself" with our own identified personal limitations and restrictions. We also need to check the weather, the airport(s), and the aircraft, and plan the needed fuel before each flight. If the weather conditions are beyond what we have set for ourselves, why push it? If the weather is beyond what we have become comfortable with, why fly into it? If the aircraft is even one second out of any required inspection or check, why fly it? If our approach plates or navigation charts are out of date by even one day, how can we safely use them? Although the fuel has grown to be a very expensive item, why would we limit it and place ourselves in a position to have to fly more direct then we need to?

Yet every year, several pilots do just that and end up being statistics for the rest of us to try and learn by. How can we stop this from happening to us? We must rely upon all of our instruction, experience, and mature judgment to try and mitigate the risk hazards and not allow impetuous actions to lead us down a path we will not like. Remember, there are at least four major items that need addressing before any flight can be initiated: the pilot, the environment, the aircraft, and the necessity of the flight!

Stop! Think! Plan! Consider! Decide! And all this is accomplished before we get in the aircraft. We are all professional pilots! We exhibit that professionalism by using our training, experience, mature attitude, and all the tools at our disposal to plan fully and properly each and every flight we make!

Al Peyus is an Aviation Safety Inspector in Flight Standards' General Aviation and Commercial Division.

Denial of Health Insurance and Medical Certification
Are They Mutually Exclusive?

By Donato J. Borrillo, MD, JD

QUESTION 18(t) on the FAA Form 8500-8 (Application for Airman Medical Certificate or Airman and Student Pilot Certificate) asks if the airman has been rejected for life or health insurance. Pursuant to the *Guide for Aviation Medical Examiners* (AMEs), the examiner should inquire regarding the circumstances of rejection and record the history in item number 60. Disposition (denial or deferral) will depend upon whether or not the rejection or denial was due to a medical condition that still exists or is disqualifying.

Recent changes in healthcare law have decreased this question's positive predictive value, and it is incumbent upon the AME to understand how an applicant can answer "no" and still have a pre-existing condition.

The Health Insurance Portability and Accountability Act of 1996 (HIPAA), took effect January 1, 1998, and set strict limits on the ability of health insurance companies and self-insured health plans to apply traditional pre-existing condition restrictions to new participants. State laws regulating access to, and premiums for, small group and individual policies vary widely; however, most states simply have enacted minimum standards to comply with HIPPA, while others have enacted laws that go well beyond HIPPA requirements.

A "pre-existing condition restriction" is a health plan's limit on coverage for (or, in some cases, refusal of coverage for) conditions in existence prior to an individual's eligibility for coverage under that plan. Historically, pre-existing condition restrictions have severely limited the ability of individuals with chronic health problems to change insurance and helped to identify pilots with undisclosed medical problems.

Today, a health insurer or self-insured group health plan may apply a pre-existing condition requirement only under the following circumstances: [a] the restriction can be applied only to a condition for which the individual received medical advice, diagnosis, care, or treatment during the six-month period before his or her enrollment date, and [b] the coverage denial period for the pre-existing condition can't exceed 12 months. In theory, the FAA question should read, "Have you been denied insurance over the past year?"

In addition, that 12-month denial period must be reduced by the period of time the person was covered under a prior health insurance plan. Thus, in the most common situation, if an airman changes jobs and was covered for more than 12 months under a health plan provided by the previous employer, there can generally be no denial of coverage for pre-existing conditions under the new employer's health insurance plan.

More importantly, the coverage denial period described above must be reduced by the individual's "creditable coverage." In a nutshell, the creditable coverage rules under HIPAA mean that a person's prior coverage under another group health plan, health insurance policy, Medicare, or certain other government programs, count toward satisfaction of the coverage denial period under a new group health plan. For many airmen, the creditable coverage rules will allow them to completely skip any coverage denial period for preexisting conditions applied by a new employer's health plan.

Finally, this employee protection can be lost if there is a roughly two month break between coverage. For this reason, employers are required to provide their employees who lose coverage under their health insurance plans with certificates detailing their length of coverage. These certificates are then used to prove prior coverage to new health insurers for purposes of determining whether and for how long coverage of a preexisting condition can be denied.

In sum, question 18(t) may appear to be straightforward; however, the AME must understand that an applicant who hasn't been "denied" health insurance may still have a disqualifying condition.

Dr. Borrillo is the Medical Director of Occupational and Hyperbaric Medicine, The Toledo Hospital, ProMedica Health System. He is also a senior aviation medical examiner, an attorney, and a pilot with a Commercial rating.

This article originally appeared in the Federal Air Surgeon's Medical Bulletin.

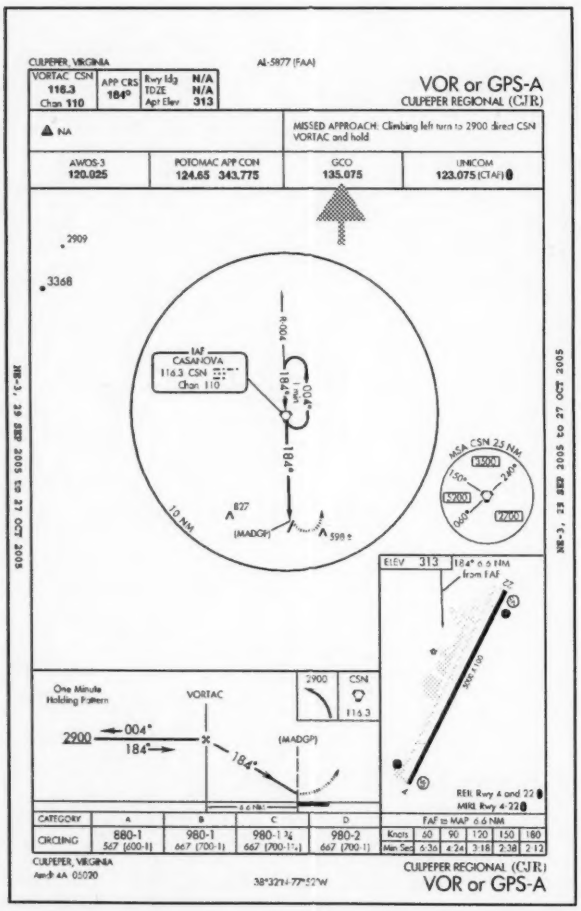
Did you know your airplane has a phone for calls to AFSS or Clearance Delivery?

by Michael Lenz

If you have a radio, you have a phone (in a manner of speaking) that can be used at airports that have installed ground communications outlets or GCO's. The GCO gives a pilot on the ground at an uncontrolled airport a means to communicate with the IFR Air Traffic Control facility and/or the Flight Service Station. This offers an opportunity for a last minute weather-update right before departure. GCO's offer clear communications as opposed to trying to hear your cell phone over the engine noise and they also beat having to rush from a pay phone to the airplane after picking up your IFR clearance.

The *Airport/Facility Directory* shows the facilities available from a GCO. Where clearance delivery service is available, the GCO frequency is depicted on instrument approach procedures charts.

Michael Lenz is a Program Analyst in Flight Standards' General Aviation and Commercial Division.



According to the Aeronautical Information Manual, *a GCO is an unstaffed, remotely controlled, ground/ground communications facility. Pilots at uncontrolled airports may contact ATC and FSS via VHF to a telephone connection to obtain an instrument clearance or close a VFR or IFR flight plan. They may also get an updated weather briefing prior to takeoff. Pilots will use four "key clicks" on the VHF radio to contact the appropriate ATC facility or six "key clicks" to contact the FSS. The GCO system is intended to be used only on the ground.*

Jeff Douglass, a pilot with Mercy Medical Airlift of Northern Virginia, says he's always been impressed with the safety and convenience offered by GCO's. "There's a bit of a trick to the microphone clicks – you really do need a full-second on and off. They're one of the best safety features I've found, and it's unfortunate that more pilots don't know about and use them."

Aviation Maintenance Alerts

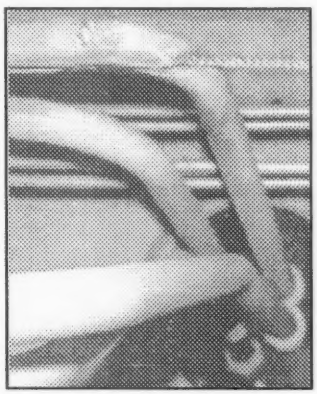
Beechcraft; G33; Loose Nose Gear Steering Rod-End; ATA 3250

A mechanic describes finding the rod-end (P/N 35-820045) loose on the nose gear steering push-pull tube (P/N 35-825044-6). This connecting terminal slides into the tube's end and is mechanically fastened by two 5/32-inch solid rivets clocked at 90 degrees. "(The) rivets were not properly driven due to (compression) inside the hollow portion of the tube, instead of (compressing) at the shop head, allowing the rod-end to come loose. Separation would cause loss of nose steering control. I recommend replacement of the solid rivets with four CR3213-5-2 CherryMax Rivets in the original holes."

Part Total Time: 7,457.0 hours.

Canadair; CL-600-2B16; Cut (sawed) Electrical Conduit; ATA 3340

A repair station technician investigates an intermittent circuit breaker fault for this aircraft's upper anti-collision light. "...(I) discovered the L/H elevator control cable had torn through the wiring conduit in the vertical stabilizer. The cable wore through the conduit (see photo below) and shorted out the wiring for the upper beacon. (I) repaired the wiring conduit, replaced the wiring, and replaced the control cable in accordance with the manufacturer's instructions." He describes ensuring sufficient clearance between the cable and surrounding conduits, but wonders about the origins of this defect. "(It) is unclear if the conduit was installed at the factory or at the time of (aircraft) completion. (I) suggest inspection of this area on other, similar aircraft. (It is a) difficult (defect) to notice due to the accessibility of this area in the tail." (The part number for this particular electrical conduit segment was not provided.)



Cessna; 182T; Contaminated Boost Pump; ATA 2822

A repair station technician gives the following description of a returned Weldon fuel pump (P/N A8160-D): "(I) received this boost pump for warranty credit with a customer complaint of '...fuel boost pump pops circuit breaker.' Preliminary inspection of the pump revealed foreign material in the inlet port. Further inspection revealed the foreign material tried to pass through the pump and had locked the rotor in the insert. This would cause the pump to draw high amps. This is the second time this problem has been seen in the last four months." (Reference another C182 in last May's Alerts.)

Part Total Time: 166.4.

Cessna; C150; Lost Rudder Hinge Bolt; ATA 5543

A mechanic writes, "The upper rudder pivot bolt backed out of its self-locking nutplate at the upper (hinge—) while in flight..." "(The) rudder was ripped from the lower bell crank control, and departed the aircraft. The aircraft landed without incident. The rudder was recovered (found), and its upper pivot bolt was retained in the rudder cap. The bolt could be inserted in the nutplate with light, finger pressure only, and removed the same way. The nutplate was worn and had lost its locking ability. At installation of a factory new rudder assem-

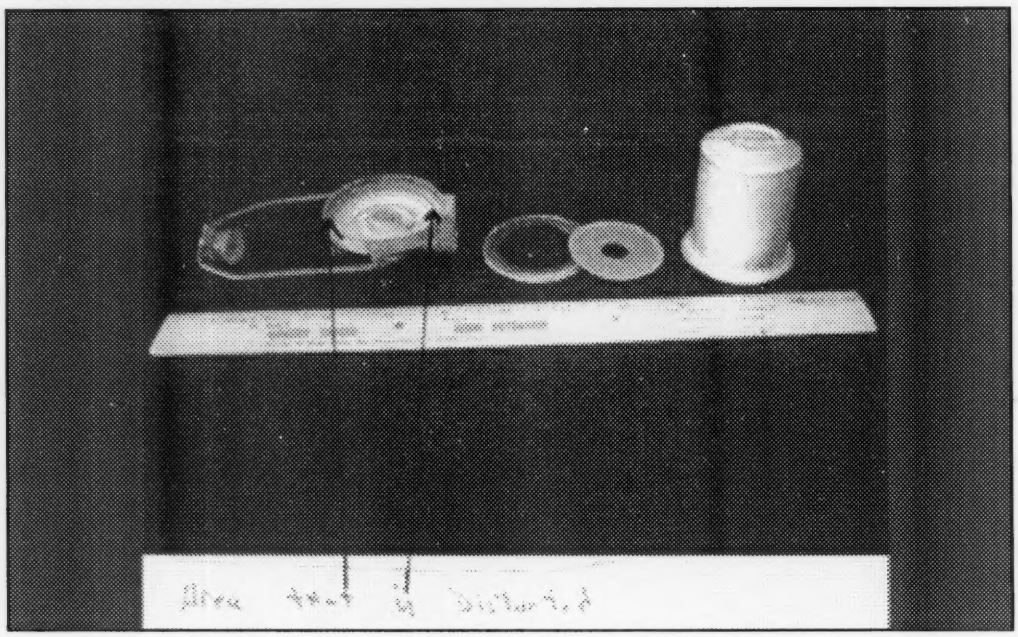
bly, a drilled AN bolt was used to include a cotter key below the nutplate." Provided part numbers are: rudder 0431001-29; nutplate NAS 682A3. (See last April's Alerts for a similar event.)

Part Total Time: Unknown.

Piper; PA 28-180; Bent Fuel Gascolator Cover; ATA 2821

This technician has observed bending deformation in the fuel filter's bowl cover (P/N 14428-00) as result of the wire assembly bail (P/N 494-644) being tightened. "Over the years, the force of the bail actually bends the frame (to the point) the gasket will no longer seal, and fuel will seep by the gasket when the bowl is rocked forward and aft—90 degrees to the location of the bail assembly. The only option to remedy the situation is to replace (the gascolator) with factory new or an STC replacement."

Part Total Time: 2,895.0 hours.



Raytheon (Beech); Model-90(s); Improper Use of Fuel Cross-Feed System; ATA 2820

(The following admonition is published as received from the Aircraft Certification Office in Wichita, Kansas.)

"This Alert addresses at least one occurrence of improper use of the fuel cross-feed systems in the Raytheon Beech Model 90 *King Air* aircraft: catastrophic consequences can result. The following represents a paraphrased scenario of the occurrence. An in-flight pilot ran the main fuel tank dry for number two engine: it quickly began to spool down. Instead of following proper emergency procedures (as engine failure, air start, etc.), the Fuel Cross-Feed, Single Engine Operation check list was improperly employed and most critically applied by following a sequenced step stating, "Boost Pump (operative engine tank)—OFF." As directed, number one engine began to die. The fuel cross-feed checklist was designed to be used only for balancing fuel after extended single engine operation, not after losing an engine to fuel starvation. The fuel cross-feed system gives access to opposite tanks—which will be empty if the opposite engine died of fuel starvation. Before all cross-feed operations, the fuel quantity should be checked in the appropriate tanks for adequate fuel supply. It is not advisable to cross-feed all of the fuel from the side of an inoperative engine as this may cause an interruption of fuel flow to the operating engine. Instead, discontinue the cross-feed and allow the operating engine to naturally rebalance the fuel. Raytheon will be publishing a revision to the Pilot's Operating Handbook and Airplane Flight Manual(s) addressing procedural changes and proper use of the cross-feed system. Owners and operators are encouraged to revise their manuals at the earliest opportunity."

(Further inquiry may be directed to: FAA, Aircraft Certification Office, 1801 Airport Road, Room 100, Mid-Continent Airport, Wichita, KS 67209 (316) 946-4100.)

Raytheon; BAE 125; Improper Sealing of Main Gear Side Stays; ATA 3230

(The following alert is published as received from the Aircraft Certification Office in Wichita, Kansas.)

"During normal maintenance on a Raytheon BAE 125 *Hawker* airplane, it was noted through visual inspection the Thiokol sealant appeared to be missing from the main landing gear side stays (P/N 25-8UN3-21O & ...-211). These are the down locking arm assemblies for the main landing gear. Disassembly of the side stay assemblies revealed Thiokol sealant appeared to have been applied to the face of the bearing during assembly. This caused sealant buildup between the side stay and the bearing race, resulting in plugging of the grease ports that supply lubrication to the bearings. Further investigation has revealed this problem to exist on both production airplanes and their spare parts. The root cause has been traced back to misinterpretation of the sealing notes on the engineering drawings.

RAC (Raytheon Aircraft Company) Engineering has released Safety Communiqué SC257, May 17, 2005, to inspect airplanes for this defect, and to rework those assemblies if the above described conditions are found to exist. The Communiqué outlines a simple check that can be performed during landing gear lubrication to confirm the locking arm assemblies are being properly greased. During lubrication, verify that grease is extruded a minimum of 25% around the bearing circumference and from multiple locations. Failure to meet the tests as outlined in the Safety Communiqué indicates the side stay should be removed, the grease gallery checked, and any blockage corrected."

(Further inquiry may be directed to: FAA, Aircraft Certification Office (ACE-116W), Chris B. Morgan, Aerospace Engineer, 1801 Airport Road, Room 100, Mid-Continent Airport, Wichita, KS 67209 (316) 946-4154.)

Socata; TBM 700; Failed Flap Attach Structure; ATA 5744

A mechanic had the opportunity to inspect ten flap assemblies on five different Socata TMB aircraft over a period of 8 months. Eight of these ten assemblies had one or more structural attachment failures. "The bonded inserts which provide the attach points for the metal carriage assembly (P/N T700A575509800) to the honeycomb flap end-rib have failed. Inspection of the inserts reveals the seal between the bonded insert and the honeycomb structure had become compromised. Water is introduced into the honeycomb end-rib and the honeycomb structure fails." "Any flap found to have movement between the flap carriage and the flap end-rib was removed from the (respective) aircraft (for inspection)." This mechanic recommends immediate inspection for mechanical integrity of the inboard and outboard flap attach points. Any noted movement between the carriage assembly and the flap end-ribs would warrant removal and further inspection. He concludes, "The manufacturer has been contacted in regard to this situation. They feel this is an isolated instance and no action may be taken on their part." (Flap total times and cycles for these defective attachments ranged from 1,607.2 hours with 2,323 cycles, to 4,562.1 hours with 6,608 cycles.)

Part Total Time: (See above.)

The Aviation Maintenance Alerts provide a common communication channel through which the aviation community can economically interchange service experience and thereby cooperate in the improvement of aeronautical product durability, reliability, and safety. This publication is prepared from information submitted by those who operate and maintain civil aeronautical products and can be found on the Web at <http://www.faa.gov/avr/afs>. Click on "Maintenance Alerts" under Regulations and Guidance. The monthly contents include items that have been reported as significant, but which have not been evaluated fully by the time the material went to press. As additional facts such as cause and corrective action are identified, the data will be published in subsequent issues of the Alerts. This procedure gives Alerts' readers prompt notice of conditions reported via Malfunction or Defect Reports, Service Difficulty Reports, and Maintenance Difficulty Reports. Your comments and suggestions for improvement are always welcome. Send to: FAA; ATTN: Aviation Data Systems Branch (AFS-620); P.O. Box 25082; Oklahoma City, OK 73125-5029.

Transition of Flight Services

On October 4, employees of 58 Automated Flight Service Stations (AFSS) transitioned from government service to the contractor, Lockheed Martin, as previously scheduled. The contract for service was awarded to Lockheed Martin on February 1, after the agency concluded a competitive sourcing initiative. Approximately 1700+ FAA employees are now Lockheed Martin employees. Lockheed Martin will continue to provide AFSS Preflight, In-Flight, and Operational Services on a 24/7 basis. Lockheed Martin will also provide special services such as supporting aviation related education and outreach programs.

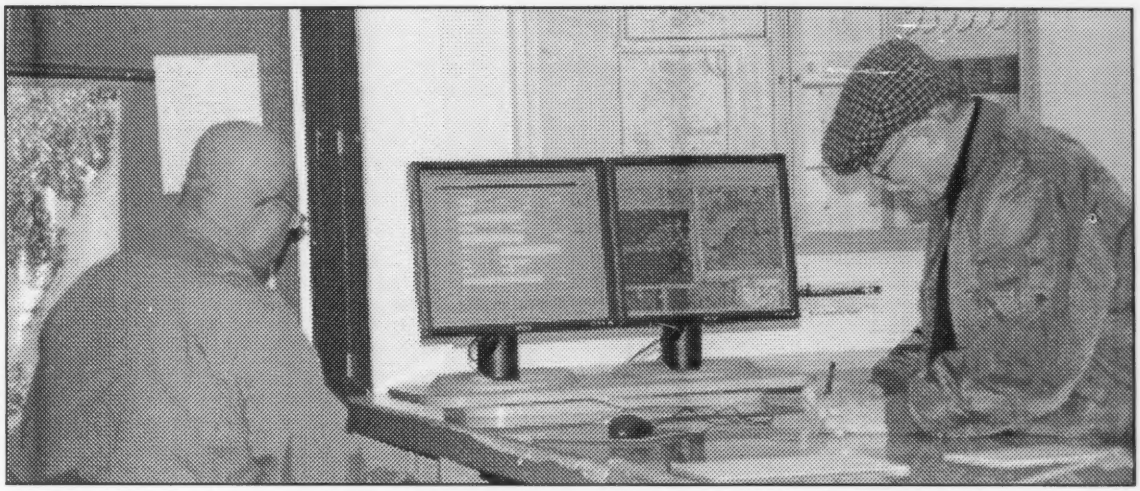
During the initial stages of this transition phase, estimated to take approximately 18 months, Lockheed Martin will use existing FAA facilities and equipment and will not require any changes to the FAA National Airspace System (NAS). After development of their Flight Service 21 (FS21) system and the completion of all required NAS interface tests, Lockheed Martin will transition from the FAA legacy equipment to the FS21 system and consolidate AFSS facilities.

The AFSS are responsible for collecting, processing, and delivering aeronautical and meteorological information to promote safe and expeditious flight. The FAA and Lockheed Martin are committed to a seamless transition. The FAA will continue to monitor the contract service provider throughout the 10 years of the contract to assure improved safety and services to the flying public as well as cost-savings for the taxpayer.

The FAA web site <http://www.faa.gov/about/office_org/headquarters_offices/ato/aca/afss/transition/realigned_discontinued/> contains the following chart, which will link to further information on the FSS transition.

Overview

Current State	Future State
AFSS disseminate regulatory and other forms to pilots, i.e. Bird Strike forms, Flight Plan forms, Pilot License Change of Address forms, and NASA Aviation Safety Reporting Service (ASRS) forms.	Users will need to request forms from the applicable FSDO. (Some forms are accessible from the Internet at <www.faa.gov>.)
AFSS are the point of contact between the public and ATC facilities for Temporary Flight Restriction (TFR) NOTAMS.	Temporary Flight Restrictions (TFR) NOTAM will contain the appropriate Point of Contact.
Many AFSS facilities currently augment weather observations compiled by Automated Weather Observation Systems (ASOS).	Four (4) sites will have Contract Weather Observers (CWO) - Service Level A. FAA Towers, Federal Contract Towers, and Non-Federal Contract Towers will assume ASOS back up and augmentation - Service Level C Non-tower airport sites will revert back to Service Level D requiring no augmentation of automated weather reports. Detailed Site info can be found in the Weather Observation Site List (see web site listed above)
AFSS continuously monitor NAS equipment and notify and coordinate outages, this includes some non-federal NAVAIDs. AFSS initiate NOTAMS for outages of NAS equipment that they monitor, including some non-federal NAVAIDs.	On October 4th, Flight Service will continue this service. As facilities consolidate into 20 sites, most monitors will be relocated to other FAA facilities. This activity will be accomplished by FAA Tech Ops Control Centers. A more detailed letter on the NAS outage activities can be found at the above web site.

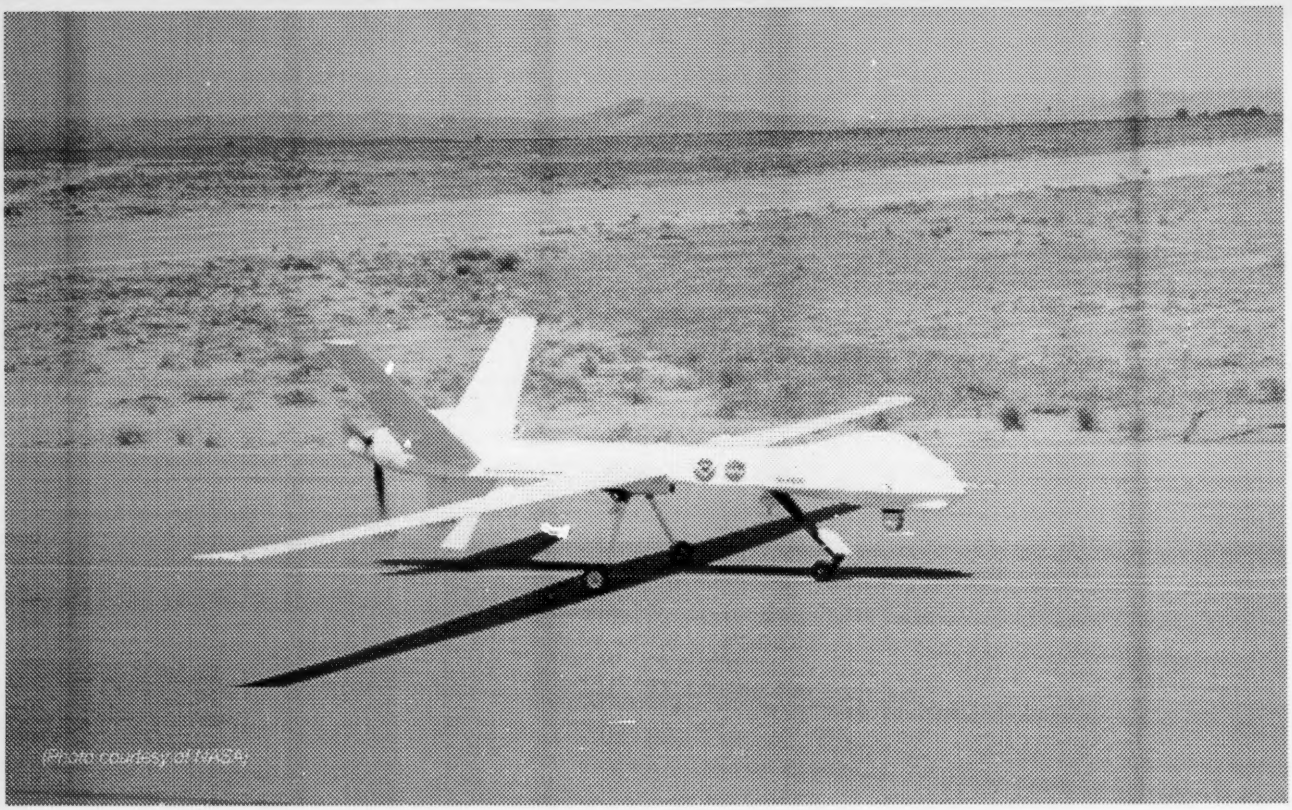


Leesburg AFSS photo by Julia Greenway

Overview (Continued)

Some AFSS provide Civil Twilight data (not to be confused with Sunrise/Sunset data).	Civil Twilight data will be provided to pilots on request when providing normal services. Other requests should be referred to the US Naval Observatory web site at <www.usno.navy.mil>.
Some AFSS provide weather services and flight planning to aircraft within Mexican or Canadian borders.	Requests for these services should be directed to the appropriate facility within Mexico or Canada. This applies to flights when both the departure point and destination are within the borders of Mexico or Canada.
Fourteen (14) AFSS respond to requests for historical weather data from sources such as local media, historical societies, attorneys, and other non-aviation related entities.	Requests will be referred to the NOAA National Climatic Data Center in Asheville, North Carolina. See <www.ncdc.noaa.gov>.
AFSS provide information to flight instructors on the flight progress of students in non-emergency situations.	AFSS will provide this information only in emergency situations.
Some AFSS monitor and control airport approach lighting.	On October 4th, Flight Service will continue this service. As facilities consolidate into 20 sites, airport lighting controls will either be relocated or become Pilot Controlled Lighting (PCL).
AFSS provide government and aviation directory assistance.	This service will no longer be provided.
AFSS coordinate FDC 91.141 Presidential/VIP Temporary Flight Restrictions and movement messages will all affected ATC facilities and other outside interests.	Air Traffic Control Towers and other FAA facilities will receive FDC 91.141 information from Service Areas/Den.
AFSS provide information to the public on aircraft accidents.	These requests should be made to FAA Public Affairs.

For additional information review a detailed description of the realigned and discontinued services in the Residual Activities "The Phase-in To Lockheed Martin AFSS" document at the above web site.



(Photo courtesy of NASA)

FAA Certificates First Commercial Unmanned Aerial Vehicle

On August 25, the FAA marked a new chapter in aviation history by issuing the first airworthiness certificate for a commercial unmanned aerial vehicle, the General Atomics *Altair*.

Unmanned aerial vehicles, often called "UAVs," are a new, developing segment of the aviation industry with great potential commercial applications. Some of the research and development activities they already perform support law enforcement, homeland security, firefighting, and weather prediction.

Unmanned aircraft have the potential to make an enormous impact on civil aviation," said FAA Administrator Marion C. Blakey. "This is the first big step toward their seamless integration into our national airspace system."

The *Altair*'s FAA airworthiness certificate is in the "Experimental" category and limits flights to research and development, crew training or market survey. The agency has also specified a number of safety conditions for the *Altair*'s operation, including weather, altitude, and geographic restrictions, as well as a requirement for a pilot and observer, both of whom may either be on the ground or in an accompanying "chase" plane.

The *Altair*, a high-altitude version of the U.S. military's *Predator* B, is designed to perform scientific and commercial research missions. Built in partnership with NASA, *Altair* has an 86-foot wingspan, can fly up to 52,000 feet, and can remain in the air for more than 30 hours.

To prepare for the increasing civil UAV market, a team of FAA experts throughout the agency is working on policies that will balance oversight without being overly restrictive in the early stages of this promising technology. The FAA is also collaborating with manufacturers to collect vital technical and operational data that will help improve UAV regulatory processes. In addition, the FAA has asked RTCA—a group that frequently advises the agency on technical issues—to help develop UAV standards. RTCA will focus on two key aspects of UAV flight: (1) command and control and (2) a UAV's ability to detect and avoid other aircraft.

The FAA also participates in the NASA-sponsored ACCESS 5 initiative to understand the difficulties of integrating UAVs with piloted aircraft. Al-

though the group's work focuses on high-altitude, long-duration unmanned operations, many of the standards will be applicable to other types of UAVs.

To date, the FAA has received seven experimental airworthiness certificate requests, including *Altair.*

FAA Fact Sheet

Unmanned Aerial Vehicles (UAVs)

Unmanned Aerial Vehicles (UAVs)—sometimes called "unmanned aircraft systems," "remotely operated aircraft," "remotely piloted vehicles," or just "unmanned aircraft"—come in a universe of shapes, sizes and purposes. They may have a wingspan as large as a Boeing 737 or be as small as a radio-controlled model airplane. Some might be programmed to fly and navigate a substantial part of the flight by computer or autonomously. Other operations are flown entirely by an outside operator, called the pilot-in-command.

Because no human pilot is actually onboard, UAVs must get information about their external environment through electronic sensors. The input from the sensors is either processed onboard, so the aircraft's computers can evaluate and monitor the flight environment and forward the data to the pilot-in-command controlling the plane, or processed on the ground.

UAVs are a new, developing segment of the aviation industry. Some of the research and development activities they already perform support law enforcement, homeland security, firefighting, weather prediction and tracking. There are many other potential commercial applications just waiting to be taken advantage of. Manufacturers and operators are conducting research on or are designing aircraft that could fill niche markets unimagined just a decade ago.

The FAA's Role: Safety First

The FAA's main concern about UAV operations in civil airspace is safety. It is critical that these vehicles don't come too close to aircraft carrying people or compromise the safety of anyone on the ground.

When the military or a government agency wants to fly a UAV in civil airspace, the FAA examines the request and issues a Certificate of Waiver or Authorization (COA), generally based on the following principles:

- The COA authorizes an operator to use defined airspace for a specified time (up to one year, in some cases) and includes special provisions unique to each operation. For instance, a COA may include a requirement to operate only under Visual Flight Rules (VFR).
- Most, if not all, COAs require coordination with an appropriate air traffic control facility and require the UAV to have a transponder able to operate in standard air traffic control mode with automatic altitude reporting.
- To make sure the UAV will not interfere with other aircraft, a ground observer or an accompanying "chase" aircraft must maintain visual contact with the UAV.

The COA process has functioned well, making possible research and development efforts and providing a means to introduce UAVs into the air traffic system. As FAA experience with COAs has grown, so has the emphasis on safety; certificates issued today typically have more conditions and limitations, particularly those dealing with a UAV's ability to "detect, see and avoid" other traffic.

Operation and Certification Standards

To address the increasing civil market and the desire by civilian operators to fly UAVs just like any other aircraft, the FAA is developing new policies, procedures, and approval processes.

- At FAA Headquarters in Washington, D.C., a team of experts from various parts of the agency is working on guidance that will increase the level of oversight in a step-by-step fashion without being overly restrictive in the early stages.
- Developing and implementing this new UAV guidance is a long-term effort and is still a "work in progress."
- More immediately, the FAA is reviewing certification requests from several UAV manufacturers. The first airworthiness certificates in the "Experimental" category (for research and development, crew training, or market survey) was recently issued. These certification efforts provide an excellent opportunity for the FAA to work with manufacturers and to collect vital technical and operational data that will help improve the UAV airworthiness certification process.
- The FAA has asked RTCA – a group that frequently advises the agency on technical issues – to help develop UAV standards. RTCA will answer two key questions: How will UAVs handle command and control, and how will they detect and avoid other aircraft?
- The FAA also participates in the NASA-sponsored ACCESS 5 effort to understand the difficulties of integrating UAVs with piloted aircraft. Although the group's work focuses on high-altitude, long-duration UA operations, many of the standards will be applicable to other types of UAVs.
- The FAA continues to work closely with its international counterparts to harmonize standards, policies, procedures, and regulatory requirements.

The Bottom Line

The UAV universe is a challenging enterprise for the FAA and the aviation community. UAV proponents have a growing interest in expeditious access to the U.S. National Airspace System (NAS). There is an increase in the number and scope of UAV flights in an already busy NAS. The design of many UAVs makes them difficult to see and adequate "detect, sense and avoid" technology is years away. Decisions being made about UAV airworthiness and operational requirements must fully recognize safety implications.

U.S./CHINA AGREEMENT ADVANCES AVIATION SAFETY, REDUCES REGULATORY BURDENS

On October 20, Secretary of Transportation Norman Y. Mineta (center) and over 200 international aviation leaders witnessed the signing of the agreement by FAA Administrator Marion C. Blakey and the General Administration of Civil Aviation of China (CAAC) Minister Yang YuanYuan (left) at the FAA's annual International Aviation Safety Forum. The Bilateral Aviation Safety Agreement (BASA) between the FAA and CAAC will reduce duplicative oversight of each other's airlines while opening the door to cooperation between the two countries in aviation safety. The agreement will reduce regulatory burdens for the airlines and improve coordination between U.S. and Chinese flight safety programs, leading to streamlined procedures that raise safety standards while making the best use of both countries' safety management resources.

SPACESHIPONE ON DISPLAY AT NATIONAL AIR AND SPACE MUSEUM

SpaceShipOne, the first privately built and piloted vehicle to reach space, joined the national collection of flight icons on October 5, in a noon donation ceremony at the National Air and Space Museum's flagship building on the National Mall in Washington, D.C.

The spacecraft, 28 feet in length with a 27-foot wingspan, is prominently displayed in the central Milestones of Flight gallery, home to many of the "firsts" of flight. It will hang between Charles Lindbergh's Spirit of St. Louis and Chuck Yeager's Bell X-1. Microsoft co-founder Paul G. Allen, the sole funder of SpaceShipOne, made the donation. Burt Rutan, the spacecraft's designer, also took part.

On June 21, 2004, SpaceShipOne left Earth's atmosphere and entered the weightlessness of space by traveling just above the 62-mile boundary mark (100 km) on an arced, suborbital flight that began with launch from its airplane mothership. It was the first time that private enterprise, and not government, crossed the threshold into human spaceflight.

"It's really gratifying to have the SpaceShipOne project recognized by the Smithsonian when it was just 10 years ago that we first started researching the possibility of private space travel," Allen said. "I saw SpaceShipOne as a great opportunity to demonstrate not just a proof of concept but also demonstrate convincingly that private space exploration could someday be within the reach of individual citizens. Ultimately, SpaceShipOne's presence in the Smithsonian shows once again that America's milestones of flight are not all behind us. It is my hope that SpaceShipOne's new home will enable the millions of National Air and Space museum visitors to view, learn about, be inspired and actively contribute to the next generation of space exploration initiatives."

In fall 2004, SpaceShipOne flew higher than the 62-mile boundary during two more suborbital flights within a period of 14 days, capturing the $10 million Ansari X Prize. The competition was designed to encourage space tourism through development of low-cost, privately owned and operated reusable spacecraft.

The project team was honored with the 2004 Collier Trophy, awarded by the National Aeronautic Association for "greatest achievement in aeronautics or astronautics in America." Allen, Rutan and their team also were awarded the 2004 National Air and Space Museum Trophy for Current Achievement.

"SpaceShipOne represents the next step in traveling beyond our

planet," museum director Gen. J.R. "Jack" Dailey said. "Hanging in the Milestones gallery, it will inspire the next generations eager to experience a new accessibility to space. We are fortunate to add this most significant craft to the world's premier flight collection."

Although equipped with three seats, SpaceShipOne was flown into space by solo pilots without passengers. SpaceShipOne's design, featuring a hybrid rocket engine, bullet-shaped forward fuselage and splayed wings that pivot up for stable re-entry, will be studied for adaptation to larger vehicles. The mothership, White Knight, will continue to fly as part of spacecraft development projects.

HAVE YOU SEEN THE NEW TAXIWAY CENTERLINES?

The FAA has changed the standard for taxiway centerlines to provide a visual cue to pilot that they are approaching a runway holding position. At the 72 airports that have the greatest number of passenger enplanements, the new markings are required on all taxiways with runway holding positions by June 30, 2008. At all other airports, the new markings are optional. If an operator decides to exercise this option, the enhanced markings must be installed at every holding position on the airfield.

Description of the Enhanced Taxiway Centerline:

- Dashed yellow lines are placed on both sides of the taxiway centerline.
- The modified centerline will be implemented approximately 150 feet prior to the runway holding position marking (if sufficient space is available).
- The enhanced centerline may or may not be supplemented by surface painted holding position signs.

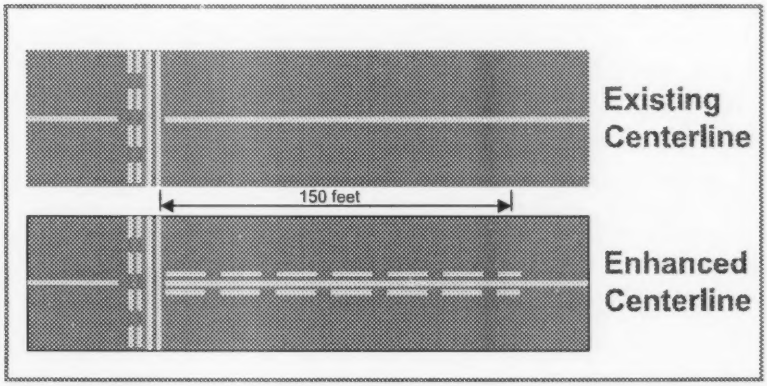
Pilot Action:

- If you encounter the enhanced centerline while taxiing be aware that you are approaching a runway holding position.
- It is recommended that you go into a "heads-up" mode to determine the exact location of the holding position and cross check your taxiing instructions to determine whether or not you are required to "hold short."

E-mail us at <dean.chamberlain @faa.gov>, if you are interested in receiving the list of 72 airports that are required to use the new taxiway centerline markings.

NASA DEVELOPS NEW ONLINE DE-ICING TRAINING COURSE FOR PILOTS

With winter here, NASA is providing pilots with a way to help them avoid the hazards of ice contamination while their planes are on the ground.



NASA developed "A Pilot's Guide to Ground Icing." It's a free, online course intended primarily for professional pilots who make their own deicing and anti-icing decisions. It's the eighth in a series of training aids developed at NASA's Glenn Research Center, Cleveland, and the first about ground icing.

Tom Bond, chief of Glenn's Icing Branch, said, "The pilot community has asked for training materials to cover the full spectrum of icing concerns. Ground icing training complements our past work for in-flight icing training. NASA worked with an international group of aviation safety specialists from both regulatory and industry organizations to develop a training tool to aid pilots across international borders."

This new educational tool was developed by an international team led by NASA researchers. The team included experts from NASA's Ames Research Center, Moffett Field, Calif.; the Federal Aviation Administration; Transport Canada; Civil Aviation Authority in the United Kingdom; Canadian Armed Forces; the University of Oregon; a fractional jet provider and an airline.

This self-guided course provides pilots with general ground icing knowledge; an understanding of freezing precipitation hazards; and the ability to improve decision making in ground icing operations. It discusses the risks of contamination; provides cues to alert the pilot to ground icing conditions; and offers actions pilots can take to help ensure safe operations. Imagery, case studies, aviator testimonials, and interactive elements are used to inform and help pilots make better operational decisions.

Ground icing accidents are often preventable. Pilots can receive training to improve the safety of their flights by using this online course.

"We are committed to supporting NASA's goal to improve aviation safety. By helping pilots and operators

understand the hazards of ground and in-flight aircraft icing, they can make better operational decisions," said Dr. Judith Van Zante, icing researcher with QSS Group, Inc., Cleveland. She was a team member at Glenn, and she was instrumental in developing the course.

The activity was supported by NASA's Aviation Safety and Security Program Office, Aeronautics Research Mission Directorate.

Previous training aids developed at Glenn focused on in-flight icing for various target pilot audiences, including: Icing for Regional and Corporate Pilots; Icing for General Aviation Pilots; A Pilot's Guide to In-Flight Icing; Tailplane Icing; Supercooled Large Droplet Icing.

The new Pilot's Guide to Ground Icing course is available on the Web at: <http://aircrafticing.grc.nasa.gov/courses.html>. For information about Glenn's icing safety work on the Web, visit <http://icebox-esn.grc.nasa.gov/>. For information about NASA's Aeronautics Research Mission Directorate on the Web, visit <http://www.aeronautics.nasa.gov/>.

FAA ADDRESSES MITSUBISHI MU-2 SAFETY CONCERNS

In response to a recent rise in accidents involving the Mitsubishi MU-2, the FAA has undertaken a safety evaluation of the aircraft. The FAA issued a letter on September 30 that made several initial recommendations to MU-2 owners, operators and aircraft maintenance technicians based on the evaluation work to date.

The FAA advised MU-2 operators to strongly consider airplane-specific pilot and maintenance training. The agency said pilots should pay particular attention to the aircraft's performance characteristics and be aware that performance expectations and control techniques common in other twin-engine turboprops do not necessarily transfer to flying the MU- 2. The FAA advised pilots to review the performance profile and recommended operating techniques before every flight with special emphasis on operations should an engine fail.

The FAA advised maintenance technicians to pay special attention to procedures for airplane "rigging"—the proper settings for items such as the engines, fuel control, flaps, flight controls, engine torque indicators and fuel flow idle settings.

The FAA began an aggressive safety evaluation in July 2005. The evaluation is performing a detailed review of accidents, incidents, airworthiness directives, service difficulty reports, safety recommendations and safety reports. It also is examining pilot training requirements, the history of the aircraft's commercial operators and possible engine problems. The goal is to identify the root causes of MU-2 accidents and incidents and determine what, if any, additional safety actions are needed.

The FAA will soon initiate a detailed flight test evaluation of the MU-2 and a review of maintenance procedures used by commercial operators. The FAA expects to finish the evaluation and issue a report later this year.

The MU-2, a twin-engine turboprop, received FAA certification in 1965. Mitsubishi produced 12 different models in two basic categories: a "short-body" and "long-body." There are currently 397 U.S.-registered MU-2 aircraft.

ANDERSON-ABRUZZO INTERNATIONAL BALLOON MUSEUM OPENS IN ALBUQUERQUE, NM

Albuquerque Mayor Martin J. Chavez, big scissors in hand, opens the city's International Balloon Museum on October 1st. The $12 million Museum is named in honor of Albuquerque balloonists Ben Abruzzo and Maxie Anderson, who in 1978 completed, with Larry Newman, the first non-stop crossing of the Atlantic in a gas balloon. On the left of Mayor Chavez is Patty Anderson, wife of the late Maxie Anderson, and on the right, is Richard Abruzzo, son of the late Ben Abruzzo. (Mario Toscano photo)

Editor's Runway

from the pen of K. Dean Chamberlain

Thank you—!

As we approach the upcoming holiday season, I would like to suggest some special gifts for the pilots and those who want to become pilots on your shopping list. Although your favorite pilot may like another tie or designer scarf, you might want to consider gift wrapping something special. First, I would suggest a gift certificate for some type of flight training. For the pilot who has everything, you might want to give the gift of a new rating. Whether it is a training course for an instrument rating, a seaplane rating—single or multiengine, a glider rating to explore the challenge of natural flight, a hot air balloon rating to coast along with the wind, or a helicopter rating to try vertical flight, a flight gift certificate would bring joy to any pilot for years to come. For those who don't want to provide a complete training course, an introductory flight in one of the training courses listed would be just as exciting. You could also find one of these training courses in your favorite vacation area and plan a vacation get-a-way to a beach or mountain resort while your pilot goes off flying. The gift of flight would not only be appreciated and long remembered, but it would also provide an element of increased safety.

Another gift that can be accomplished in your local area is a few hours of recurrency training for your pilot with your neighborhood airport certificated flight instructor. If you give three hours of flight training and your pilot attends a safety meeting as outlined in FAA Advisory Circular 61.91H, *Pilot Proficiency Award Program* (WINGS), not only will your favorite pilot be a more proficient pilot, but he or she can use the training to meet the flight review requirement of Title 14, Code of Federal Regulations §61.56. The perfect win-win situation.

Not only will this training help make your favorite pilot a safer pilot as he or she starts the new year, but you deserve a special gift yourself. You could treat yourself to some flight training. If you are not a pilot, you could take some flight lessons, preferably through solo, so that you would know how to handle the aircraft you normally fly in. Although the risk may be minimal, it is nice to know that in case your favorite pilot has an incapacitating medical problem in flight or an in-flight aircraft emergency, you could provide critical support based upon your own training. If you don't want to complete a solo training course, there are short familiarization courses, such as the AOPA Pitch-Hitter™ course. These courses are designed to teach basic flight skills such as radio procedures, aeronautical chart reading, and how to fly and land an aircraft for the non-pilot.

Although I think flight training is always the best gift to give because it promotes flight safety, there are other gifts that any pilot would love to have. For example, if cost is no issue, does your pilot have a handheld aircraft band transceiver? What about a handheld GPS unit? If your pilot has a handheld radio and GPS, which in today's complex National Air Space are almost necessities, a noise-canceling headset would make a great gift. Plus, the noise-canceling headset may help save your pilot's long-term hearing. Other great gift ideas include flight training books and all of those indispensable flashlights and other items we all carry around in our flight bags. And remember, the more gifts you buy, the greater the need to have something to carry all of that gear in. So remember, flight bags make perfect gifts. Like "aviator" wristwatches and sunglasses, the bigger the flight bag the better. After all, your pilot has to be able to carry all of the trademarked flight items of an aviator to be able to shout to the world, "I am a pilot." Although handheld electronic flight computers are always appreciated, the old mechanical E6-B flight computer never needs batteries.

Your local airport operator should be able to help you with flight training gifts, and the Internet is a great place to find pilot supplies and a list of all of the businesses that sell aviation supplies and provide special types of flight training, but I think one of the best places for aviation gifts, especially aviation historical books, is the National Air & Space Museum in Washington DC. The Smithsonian's general Internet web site is <http://www.smithsonianstore.com>. With a little bit of searching through all of the many Smithsonian museums' different types of gifts, you can find anything from World War II-type leather flight jackets to aviation ties to aircraft books for your aviator.

As we close out this year, the staff of the *FAA Aviation News* want to thank you, our readers, for the privilege of being able to share our thoughts and articles with you this year, and we want to wish you and your family a safe and happy new year.

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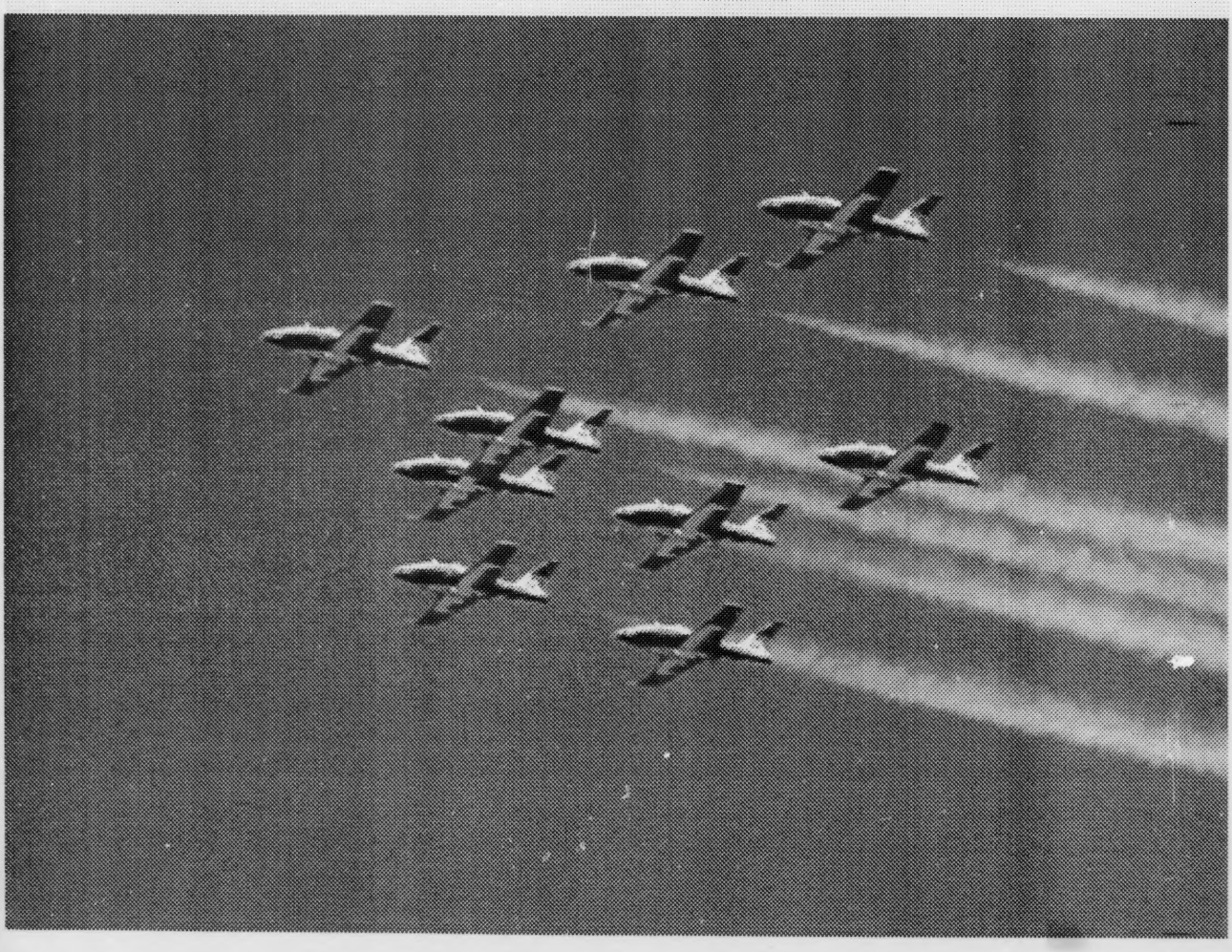

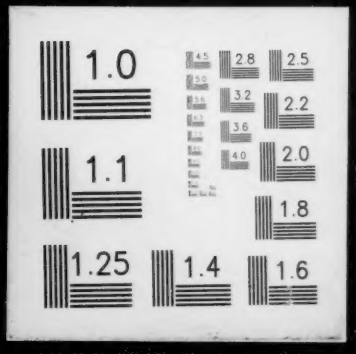
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